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PREFACE.

In surgical works many of the instruments for performing operations are not illustrated. In illustrated catalogues, on the other hand, a description of the *modus operandi* is wanting. A good drawing of an instrument imparts an accurate conception of its form and construction. A description of the application added to this gives a clearer idea of its suitability to the end proposed.

These facts have induced the publication of the present volume, in which we attempt to explain the use of the instruments and appliances by accompanying the illustrations with pertinent quotations from the writings of inventors and authors, as published in medical periodicals, recent works on surgery, and from other sources; as far as possible proper credit being given. By consulting the following pages and comparing the observations and experiments of the various authors, practitioners of surgery may form their own opinions, and be assisted in the choice of the most approved instruments and apparatus for the accomplishment of their purposes.

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ONE BRONZE MEDAL

AT

International Exhibition,

PARIS, 1867.



TWO FIRST MEDALS AND HONORABLE MENTION

AT

SANTIAGO, CHILI, 1875.



INTRODUCTION.

SURGERY, OR CHIRURGERY.

“Gr. *χειρ*, the hand, and *εργον*, labor: that department of the art of healing which appertains to the diagnosis, prognosis and treatment of the class of diseases which require manual or instrumental measures for their cure. The sphere of surgery is more limited and at the same time more accurately defined than that of medicine. Surgery divides tissues or parts improperly united, and unites those which have been divided when they should remain in unison; separates whatever has become dangerous or inconvenient to the patient; removes foreign bodies, or parts of the body which from disease or loss of vitality have become foreign, whenever they exert a hurtful influence on the animal economy; restores to their activity or replaces in their natural position portions of the body which have become displaced; checks the loss of blood from wounded or divided bloodvessels; reduces inflammations, or removes purulent or phlegmonous matter which may have been deposited by them; repairs and corrects deformities and distortions, and effects the replacement of lost tissues. Its means of accomplishing these results are the hand, lint, bandages and apparatus of various kinds, cutting, crushing, and probing instruments, catheters, bougies, sounds, forceps, specula, &c., and the various forms of cauteries, direct and indirect, liquid and solid.

“The earliest surgeons of whom there is any record were the Egyptian priests. According to Herodotus, we owe to them the use of the moxa and the adaptation of artificial limbs. Among the ancient Hebrews there is but little evidence of surgical skill, and that little was confined to the priests. In Greece, surgery is as ancient as the mythic period of its history. Chiron the centaur, born in Thessaly, and skilful in the application of soothing herbs to wounds and bruises, is the legendary father of Greek surgery. But Æsculapius, the son of Apollo, said by some to have been the pupil of Chiron, though others call him his predecessor and superior, won the highest fame in that early time for surgical skill. He is said to have been deified, on account of his wonderful success, about fifty years before the Trojan war. Temples were reared for his worship, which became the repositories of surgical knowledge, at Epidaurus, Rhodes, Cnidus, Cos, and Pergamus. Homer has immortalized his two sons, Podalirius and Machaon, the companions of Agamemnon in the Trojan war, where they rendered essential service in healing the wounds of the Grecian heroes. The Asclepiades, or reputed descendants of Æsculapius, retained the monopoly of surgery as well as medicine in their family. They had established in this period three schools of medicine, at Rhodes, Cnidus, and Cos.

“Pythagoras, in the sixth century B. C., established at Crotona a new school of medicine, in which his peculiar philosophy was probably applied to the art of healing; among its early pupils was Democedes, eminent as a surgeon, who when taken captive by the Persians reduced the dislocated ankle of Darius and removed or in some way cured the cancerous breast of his queen Atossa, after the Egyptian physicians had failed. The want of anatomical knowledge, no dissections being allowed, was a fatal bar to any considerable progress in surgery. Hippocrates (about 400 B. C.) more than any of his predecessors advanced surgical treatment; he reduced dislocations and adjusted fractures, used the trephine, applied the forceps in accouchment, made incisions into the kidney for the removal of calculi, performed amputations, and perforated the cavity of the ribs in empyema and hydrothorax. Interdicted from human dissection, he practised the dissection of the ape tribe, as nearest to man in anatomical structure, and thus obtained much knowledge. For a century after the death of Hippocrates we meet few names of note in surgery. The founding of the Alexandrian school under Ptolemy Soter, about 300 B. C., was another important epoch in the advance of the art. Herophilus and Erasistratus, the two great leaders of the medical school of that university, if it may be so called, were eminent both as physicians and surgeons; with them commenced the practice of human dissections. The extirpation of the spleen, and the application of remedies direct to scirrhusities and tumors of that viscus and of the liver, were among the bold operations of Erasistratus. To him also belongs the invention and application of the catheter in cases of retention of urine. The pupils of these eminent surgeons invented bandages of peculiar forms, and introduced the tourniquet and contrivances for reducing dislocations of the femur. One of them, Ammonius, employed an instrument for lithontriptic purposes, anticipating Civiale's process.

“Rome, in the first seven hundred years of its history, produced no surgeons of note. Celsus, who flourished about the beginning of the Christian era, was the greatest of the surgeons of ancient Rome, and his observations on injuries of the head, on cataract, on the ligature of wounded arteries, hernia, lithotomy, fractures and dislocations, amputations and carbuncle, show considerable knowledge. Aretæus, the first to use the cantharides blister, Heliodorus, Rufus the Ephesian, all of whom flourished between A. D. 50 and 120, and after them Antyllus, added to the surgical knowledge of the time new views of the treatment of injuries of the head, the resort to arteriotomy instead of venesection in sudden emergencies of inflammatory action, bronchotomy in some acute diseases of the throat, the radical cure of hydrocele by free incision of the parts, and a more thorough investigation of diseases of the kidneys and the bladder. Galen devoted more attention to medicine than surgery, but his observations on hernia, on luxation of the femur backward, and on the application of the trephine on the sternum in empyema, are of importance. In the early period of Christianity surgery languished; the early Christians opposed dissection as strongly as the pagans, and by attributing

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the power of healing wounds to martyrs and their relics, discouraged all efforts at improvement in surgical science. The first eminent name among the surgeons of the dark ages is Aëtius (500 to 550), whose surgical writings are numerous and valuable. He practised scarification of the extremities in anasarca, operated for aneurism, endeavored to dissolve urinary calculi by internal remedies, discussed hernia with great ability, and wrote on encysted tumors, injuries to nerves and tendons, diseases of the eyes, &c. Alexander of Tralles, a younger contemporary of Aëtius, wrote treatises, now lost, on diseases of the eye and on fractures, which were highly commended for their originality by some of his successors.

"Paulus Ægineta, in the seventh century, was a surgeon of eminence and considerable originality. His sixth book has been considered by many as the best body of surgical knowledge prior to the revival of letters. He recommended topical, in preference to general bleeding, as more effective in reducing local inflammation; resorted to copious venesection to accelerate the painful descent of calculi through the ureters; opened internal abscesses with caustics; defined the points for performing paracentesis in ascites; made his incision in lithotomy on one side of the raphe instead of the centre, as Celsus had recommended; practised both laryngotomy and tracheotomy, the latter as a means of carrying on respiration during occlusion of the larynx; treated of fracture of the patella, and was the originator of the obstetric operation of embryotomy.

"The Arabian physicians, who rose into distinction as those of the West declined in reputation, did little for surgery. Rhazes (about 900) described for the first time *spina ventosa* and *spina bifida*, cauterized the wounds from the bites of rabid animals, opposed the use of the knife in cancer except when limited and when the whole tumor could be removed, and gave a clear and satisfactory description of the treatment of hernia. Avicenna (died about 1036) introduced the flexible catheter. Albucasis (died about 1106) introduced an instrument for the cure of *fistula lachrymalis*, invented the probang, and in wounds of the intestine practised union of the divided parts by suture with success.

"In Catholic Europe medical practice and what of surgery remained was mostly in the hands of the clergy until, by the edict of the Council of Tours, in 1163, they were interdicted from all surgical practice. The Jews were at this period and for a century or two later in high repute as physicians, but they seem to have had a dislike to surgery. Guy de Chauliac, a priest, compiled from the Greek and Arabian authors the earliest work of modern times on surgery, but with very little judgment of what was worth retaining. For two centuries and more surgery was mainly in the hands of illiterate barber surgeons. The revival of surgical science dates from the appearance of Vesalius (died 1564) as a teacher of anatomy in Italy, followed soon after by Fallopius and Eustachius. Surgery was then for the first time put upon a sound and scientific basis, that of careful dissection, and Ambroise Paré, a French army surgeon who had educated himself in anatomical science, was the first of its great lights. He was surgeon successively to four Kings of France, and was attached to the French armies as surgeon-general down to 1569. To him we owe the revival and improvement of the practice of tying the arteries after operations and wounds, instead of cauterizing them with hot iron or boiling oil. The pupils of Paré added little lustre to their master's name; but in Italy, at the close of the 16th century, Fabricius ab Aquapendente flourished at Padua, and his *Opera Chirurgica*, the first really valuable treatise on surgery of modern times, passed through seventeen editions. He was the preceptor of Harvey. Wiseman, sergeant-surgeon to Charles II., was the first eminent surgical writer and practitioner in England. His recommendation of immediate amputation in military practice, when the preservation of the limb was impossible, has been followed from that time to the present. He left eight treatises on surgery, which are not without value even at the present day.

"The flap operation in amputation is claimed for James Young, an English surgeon contemporary with Wiseman, and also for two French surgeons, Verduin and Sabaurin, of the same period. In Germany, during this century, Hildanus, Scultetus, Purmann, and Heister were the principal surgical writers and practitioners. In Italy the principal names of note toward the close of the sixteenth and in the seventeenth century were Taliacotus, the originator of the restorative surgery in Europe: Cæsar Magatus, who greatly simplified the treatment of wounds and M. A. Severinus, who banished the salves and plasters which in Italy had usurped the place of operations.

"The eighteenth century witnessed a still greater advance in the science. In England, Percival Pott, well known for his investigation of that form of caries of the vertebra known by his name, and the most judicious writer of modern times on fractures, amputations, injuries of the head, and diseases of the spine; John and William Hunter, the former the great master of the principles of surgery in the profession; Cheselden and Douglas, both famous as lithotomists; and the two Monros, father and son, are among the great names of the surgical profession.

"In France flourished La Peyronie, at whose instance Louis XV., in 1751, founded the academy of surgery; Jean Louis Petit, the greatest French surgeon of the eighteenth century; Ledran, Garangeot, and the illustrious Desault, the originator of clinical surgical instruction and the inventor of numerous admirable apparatus for the treatment of fracture. Among the celebrated surgeons of other European countries were Molinelli, Morgagni, Scarpa, Bertrandi and Moscati in Italy; Deventer, Albinus and Camper in Holland; and Platner, Röderer, Brambilla, Theden and Richter in Germany.

"During the eighteenth century the ligature of aneurismal arteries of large size, the treatment of hernia and *fistula in ano*, the cure of *fistula lachrymalis*, and the skilful management of dangerous and difficult parturitions, were the most important branches of surgery in which there was a material advance from the preceding century; the proper construction of instruments also received great attention.

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"The nineteenth century has, however, done more for the improvement of this science than all the centuries which have preceded it. In England, Abernethy, Sir Astley Cooper, Liston, and others of the highest reputation have passed away, and others hardly less eminent remain; in France, Depuytren, Roux, Lisfranc and Larrey have had no superiors, either before or after them.

"The following may with propriety be particularized as among the improvements of the age in surgery: the introduction of anæsthesia; resection of the bones at the joints; the preservation of the periosteum and consequent development of new bone; partial amputations of the foot, as instanced in the operation of Lisfranc for the removal of the metatarsus, and of Chopart, Symes, Malgaigne and Pirogoff for disarticulation of tarsal bones; the amputations at the thigh and shoulder joints; the ligature of arteries within the trunk and immediately at their departure from it; the resection and removal of portions or even the whole of the upper or lower jaw; the operation for cleft or deficient *velum palati* or palatine vault; the opening by longitudinal section of the air passages at different points to avoid asphyxia; the resection and extirpation of the uterus, of the ovaries, and of the lower portion of the rectum; the introduction of the silver suture, especially in operations on the viscera, as for recto-vaginal and vesico-vaginal fistulæ; the adoption of the immovable apparatus for fractures; the process for remedying ununited fracture; the substitution of milder means for the trephine in all except the most serious cases; the improved treatment of ulcers and abscesses; the cure of the most formidable aneurisms by the ligature of the carotid, subclavian, axillary, humeral and external and internal iliacs; the treatment of varicose veins; the successful treatment of calculus by lithotripsy, in consequence of the great improvements made in the processes and instruments; the diagnosis and treatment of tumors, whether encysted, fatty, vascular or malignant; the cure of strabismus, and the generally improved treatment of diseases of the eye, including the invention of the ophthalmoscope by Helmholtz, in 1851, and the reformation of ophthalmic medicine and surgery carried on by Von Græfe, Donders, Bowman, Toynbee, Wilde, Von Tröeltsch, Politzer, and others; the restorative processes, by which the nose, lip and other parts are reformed from adjacent tissues; the treatment of harelip and club-foot; and the notable advance consequent upon the conservative treatment of gunshot and other wounds of the brain. Modern conservative surgery is marked by the care that is taken for saving blood in operations (Esmarch). Excision of diseased joints in cases where the whole limb would formerly have been removed, arm or leg can be preserved with a degree of impairment of movement that makes it only less useful than the limb before it was diseased.

"The adoption of the antiseptic system has made it possible to counteract the noxious qualities of 'infected' air in hospitals, and with the aid of the new method operations are carried on with diminished mortality and almost assured safety, and are made to confer life and health upon thousands who must otherwise have suffered for years or have miserably perished. Among the most striking operations of this kind may be named the extirpation of deep-seated and important organs, such as the pancreas, spleen, kidney and thyroid gland, the removal of a part of the stomach and pylorus (Billroth), and of a part of the small intestine, both with perfect recovery. Intubation of the larynx, removal of the larynx and substitution by an artificial voice-organ, has been performed; the use of the laryngoscope has made the easy removal of morbid growths and foreign bodies an every day proceeding. The invention of improved ligatures made of various kinds of animal tissue and their application with antiseptic precautions. Wounded joints are freely opened and successfully treated. Among the new operations in plastic surgery may be named skin-grafting and the transplantation of the cornea, &c., &c."—"American Cyclopædia."

The Past and Present Methods of Operating.

"Long after anæsthetics came into general use surgeons dwelt with much emphasis upon the necessity of cultivating a habit of operating *rapidly*. Now, while every surgeon aims to diminish the period of anæsthesia, mere *haste* at an operation is only mentioned to be condemned. No part of the elaborate preparations are designed to render the operation simply more rapid. One thought and purpose occupy the mind of the surgeon, and that is *recovery without suppuration*. To this end all his preparations are made, and the entire procedure is subordinated.

"Formerly the surgeon prepared his instruments only by keeping them free from rust, and giving them a fine edge. When he operated the instruments were taken from the case, and, without any cleansing, were so placed that he could most readily select the one required. During the operation he laid them down, or dropped them, and without cleaning applied them again to the wound.

"Now instruments are not only protected from rust and all soiling and kept sharp, but long before the operation they are placed in a carbolic solution, in order that any possible septic matter on them or their handles may be destroyed. During the operation one assistant devotes himself entirely to the duty of handing the instruments to the operator, and of receiving them from him and at once submerging them in the disinfectant liquid. To avoid the possibility of laying an instrument down on an unclean surface, and then putting it in the wound soiled, towels wrung out of the antiseptic fluid are spread around the wound. In preparing a part for an operation, as amputation, the surgeon used to do nothing further than, perhaps, to have superfluous hair shaved off, and that, too, often without soap and water. Patients brought directly from the street or shop, with limbs begrimed with dirt and filth, were subjected to operations without bathing. Even when there was ample time for preparation little or no thought was given to the immediate

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condition of the part about to be incised. The accumulated secretions of the skin, and the dead epidermis, charged with poisonous animal matters, became part of the wound and its immediate surroundings. Through this layer of filth the surgeon passed his knife into the living tissues beneath, conveying to the deepest parts of the wound matters of untold septic virulence. In this simple failure to secure ordinary cleanliness of the surface, more wounds were poisoned and induced to suppurate than from any other cause. In the closure of the wound the filthy margins were often brought in direct contact with the cut surfaces, and thus the propagation of the germs of fermentation or putrefaction were implanted in a fertile soil.

"Now, the greatest pains are taken to cleanse the part about to be operated upon. In addition to a general bath, the entire limb, including the hand or foot, is washed with soap and water, with a flesh-brush, and all the hairs are shaved clean from the part. This washing is followed by a douche of an antiseptic solution, and then all the parts adjacent to the wound are covered with towels, wrung out of bichloride solution.

"Formerly the personal preparation of the surgeon and his assistants for the operation was limited to self-protection against soiling their clothes or persons. *Now* the surgeon and his assistants take infinite pains with their hands. Soap and water and the flesh-brush are brought into active use, to be followed by a douche of bichloride solution. The nails are rendered scrupulously clean.

"The sponges of former times were universally believed to be the carriers of filth to the wounds, and yet little was done to purify them except to cleanse them in water.

"Now, the process of purification of sponges is elaborate in the extreme, and is so exact in details as to render them perfectly harmless in wounds.

"The ordinary silk ligatures were formerly regarded as necessarily foreign bodies in wounds, and no care was taken of them to improve their condition. They were carried about in any convenient pocket, and at the operation the silk was cut of proper lengths, waxed, and then drawn through a button-hole of an assistant, or laid on any convenient surface.

"Now, the ligature undergoes a long process of cleansing and disinfection at the hands of a chemist, and is then applied to a reel enclosed in a corked bottle filled with antiseptic fluid. From this bottle it is removed only as it is drawn out at the moment of using it. Considering the well recognized fact that the ligature, as formerly used, was an intense irritant to wounds, it is not surprising that surgeons applied as few as possible. From time to time they resorted to other methods of closing arteries, as by torsion, or metallic wires, to avoid the use of silk. But all these devices bore no comparison to the simple and efficient antiseptic ligature of to-day. Reeled off from the bottle, clean, strong and supple, the surgeon applies them without other limit than the complete suppression of hæmorrhage.

"Formerly, the operation being completed in the shortest possible time, the operator concluded by exploring all parts of the wound with his unwashed fingers. It was a common occurrence, also, for the surgeon to invite any bystander to examine the wound with his fingers, and sometimes several persons would avail themselves of the opportunity to improve their tactual sensibilities.

"Now, the most scrupulous care is taken to protect the wound from injury, either at the hands of the surgeon or his assistants. No one is now allowed, invited by courtesy or to obtain an opinion, to examine the wound by digital exploration unless they have made due preparation for the act.

"In closing an ordinary wound the surgeon formerly took great pains to provide for the drainage of pus. The most dependent part of the wound was left open, and all the ligatures were drawn out at that point. The edges of the skin were brought into apposition by the interrupted suture, at intervals of half an inch, and the intervening skin was approximated by adhesive plaster. The suture and adhesive plaster were alike unprepared by any process that would relieve them of filth, and too often both contained the germs of putrefaction.

"Now, the surgeon employs sutures that, like the ligatures, have been relieved of all possible elements of poisoning, both in their preparation and in the method of preserving them. Wherever there is a liability of the collection of fluid he inserts a drainage tube, to prevent distention of the wound and possible putrefaction.

"The final dressing of the wound formerly was the adhesive plaster and the bandage for support and retention. The plaster was never rendered aseptic, and by its close relations to the wound was dangerous. The bandage was usually of unbleached muslin, and had no special cleansing or preparation for the wound. It may not have been harmful, but it added to the risks of infection.

"Now, the wound once closed, is protected from external infection by dusting the surfaces with iodoform. Then pads of disinfected materials, with iodoform sprinkled between the layers, are applied; sometimes over a large area around the wound, and in considerable numbers. The whole is retained by bandages of disinfected materials, carefully preserved in a disinfected atmosphere. The addition of these external dressings, prepared with so much care, and adjusted with so much painstaking, has been very much criticised. It is possible that they are often unduly multiplied, but the results justify the faith which so many surgeons have in them.

"In speaking of the closure of wounds, it should be stated that, while the older surgeons did not close many wounds, as those of exsection, surgeons now close all such wounds. The difference in treatment is one of the most striking features in the comparison of the surgery of the present time and that of the decade past. The former sur-

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geon prepared the wound for suppuration, the later surgeon dressed it as for union without suppuration. Both uniformly realized their expectations.

"If we follow the wounds treated by these two methods, from the first to the last dressings, the contrast is remarkable. If the wound were large, on the second or third day the fever formerly began, announcing suppuration, and from this date, for weeks after, the dressings were changed daily, one, two or three times. The pus-basin, the irrigator and the dressing forceps were in constant demand. In many wounds the suppuration was so profuse that vessels were placed under them which received the continuous discharge. The fever generally ran high, with consequent exhaustion and depression of the patient. Septicæmia, as we now understand it, was the intermediary fever of that day, and was regarded as a usual, if not a necessary sequel of all considerable operations. Following this fever, or rather insidiously engrafted upon it, were chills, fever and profuse sweatings, now recognized as pyæmia, but then regarded as only another stage of surgical fever. Few indeed survived this fever; and in the diffused or metastatic abscesses revealed at the autopsy the surgeon discovered a cause of death quite beyond his power to prevent, control, or even comprehend. The vast change in the progress of operated cases during the past ten years can scarcely be realized. The wound is now dressed with no expectation that fever will rise, or that suppuration will occur, or that the dressing will require renewal on account of the presence of pus. The patient sleeps and eats well from the first, and the surgeon removes the dressing, often only to find the wound united. This remark is true, not only of incised wounds, but equally of wounds of amputation, excision, ligation of arteries, &c.

"In reviewing the surgical practice of Bellevue, it is not difficult to determine the essential feature of the present methods as compared with those of the past. Cleanliness is the one great object sought to be attained in all operations. Whatever may be the final conclusion of scientific students as to the cause of putrefaction in wounds, practically it is determined that the surgeon may, with the most absolute certainty, protect an ordinary open wound from suppuration. To effect this object he finds that he has simply to resort to those measures which are known to secure perfect cleanliness of the wound. The agents now relied upon and found efficient are: 1. Soap and water to the external parts; 2. Carbolic solutions for the instruments; 3. Bichloride solutions to all surfaces and tissues; 4. Iodoform for external dressings. We may summarize the conditions regarded as essential to success as follows, viz.: *a clean operator; clean assistants; a clean patient; clean instruments; clean dressings.*"—Stephen Smith, M.D., Surgeon to Bellevue Hospital. *Medical Record*, November 17th, 1885.

THE SURGEON'S OUTFIT, OR ARMAMENTARIUM CHIRURGICUM.

"The surgeon cannot employ rude articles, as a butcher's knife or a carpenter's saw, in amputation, unless he is placed under circumstances which prevent his obtaining suitable instruments. And he is required to employ the more recently devised instruments which have been recommended by the best authorities as preferable to those formerly in use, provided they are reasonably accessible to him. They should be so constructed as to be readily made aseptic and maintained in that condition. For this purpose the handle should be, as far as practicable, smooth, and made from non-absorbent material, and the setting of the blade should have no recesses for filth. They must be kept in good order, as dull knives, broken forceps and imperfect saws seriously complicate operations. They must, finally, be kept in a state of scrupulous cleanliness, as blood and pus may convey contagion to the person next operated, and rust and filth may fatally poison a wound."—STEPHEN SMITH, M. D.

The *case* of instruments which the surgeon must provide depends upon the variety of operations which he undertakes. To aid him in selecting his *armamentarium* is the object of this present catalogue.—G. T. & Co.

EXTRACT FROM GENERAL REPORT OF THE JUDGES OF GROUP XXIV.

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AT THE

WORLD'S EXPOSITION, NEW ORLEANS, 1885.

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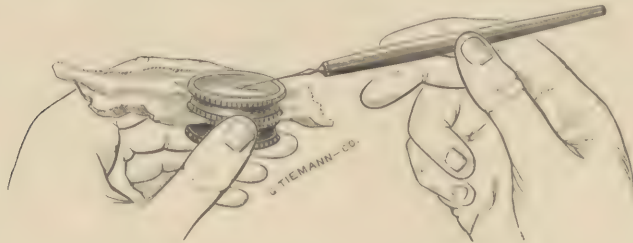
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CARE OF INSTRUMENTS.

TEST DRUM, TO TRY THE EDGES OF EYE INSTRUMENTS AND LANCETS.



Every practitioner, after having selected, should know how to take proper care of his armamentarium. In order to do this intelligently he should understand something of the mechanism of instruments.

The materials of which the blades of general operating instruments are made are steel, silver, platinum, gold and aluminum. German steel is used for forceps and blunt instruments, owing to its tenacity; English cast-steel for edge-tools, as it receives a high temper, a fine polish, and retains its edge. Silver, when pure, is very flexible, and is useful for catheters which require frequent change of curve; when mixed with other metals, as the silver coin, it makes firm catheters, caustic holders and canulated work; seamless silver instruments are least liable to corrode. Platinum resists the action of acids and ordinary heat and is useful for caustic holders, actual cauteries and the electrodes of the galvano-cautery. Gold, owing to its ductility, is adapted for fine tubes, as eye syringes, &c. Aluminum is, by its extreme lightness, suitable for probes, styles, pessaries and tracheotomy tubes. German silver and brass-plated instruments are used extensively, owing to their cheapness.

The handles may be made of ebony, ivory, hard rubber or shell. Ebony is more generally used for larger instruments. Ivory is more expensive, but makes a durable and beautiful handle—especially adapted for scalpels and eye instruments. Shell is more used for light instruments—as those of the pocket case. Hard rubber makes an excellent handle, combining neatness, lightness and durability, and may be baked on to the blades when desirable—as for anti-septic knives, &c.

Next to the materials, the making of the instrument determines its quality. If the steel is overheated in the forge the knife will be brittle or rotten; in shaping it with the file the form may be destroyed; in hardening and tempering the steel may be spoiled; in grinding and glazing the instrument may be rendered worthless. In every stage of the manufacture, therefore, the value of the instrument depends upon the personal skill of the workman. The last act of the maker is to polish and sharpen the instrument, and thus adapt it for use.

The tests of the quality of instruments are as follows: Draw the cutting edge of an instrument from heel to point slowly and lightly across the border of the nail, and it will catch or stop at every "nick;" draw it across the flat of the nail, and if at any point the edge is seen to be wiry or smooth, it is soft, and must be re-applied to the hone. For pointed instruments, stretch upon a "test drum" a very thin piece of gold-beater's skin, and push the point through. If it enter smoothly and easily, the point is good; but if a slight cracking noise is heard, it is defective. If a lancet is tested, see-saw the edge in the opening, and if it glides over without cutting or cuts roughly the edge is imperfect.

The preservation of instruments in good condition requires careful attention in the following details: Select a place always free from moisture and dirt for their safe keeping. Polished instruments should be suspended or placed in cases lined with oil-dyed velvet. After being used every instrument should be thoroughly cleaned with warm water, and perfectly dried with chamois, or the fire, before it is returned to the case.

Silver instruments tarnish when they are exposed to the air, or brought in contact with hard or soft rubber, caustics or acids. To preserve the edge and polish of instruments, the surgeon requires two or three small hones, some fine emery paper, two or three screw-drivers, small files, rouge, crocus or other polishing powder, chamois and gold-beater's or kid skin.

Cutting instruments should have their blades kept in perfect order by a judicious use of the hone. Occasionally the blade must be ground by a competent workman.

Blunt instruments, which are designed to enter natural or other passages, should be frequently polished with rouge and chamois skin, in order to maintain smooth and unblemished surfaces. Very fine emery paper will remove rust spots; but it is best to prevent their formation by the rubbing with rouge.

Saws are sharpened with three-cornered files, applied lightly in the direction of the original cut of the teeth.

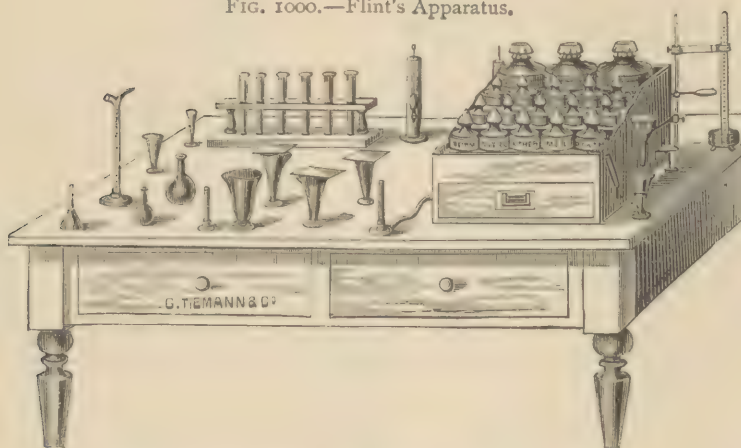
Rust spots on capital saws, especially when on or near the teeth, should be carefully scraped off with a sharp pocket knife; for, if emory paper be used by an inexperienced hand, the wire edge of the teeth may be polished off and the saw deprived of its cutting power. After the saw has been thus sharpened once or twice, the set of the teeth must be renewed by a competent workman. Metacarpal and other small bone saws have double teeth and require very careful filing, as each tooth must have a wire edge raised on its exterior—this allows the blade, which ought to be thinned a little on the back, to follow easily in the kerf. Chain saws are rather delicate instruments, which none but an experienced workman should attempt to sharpen.

THE American Armamentarium Chirurgicum.

DIAGNOSTIC.

APPARATUS FOR URINARY EXAMINATIONS.

FIG. 1000.—Flint's Apparatus.



Flint's Apparatus for Urinary Examinations.

Black Walnut Case, with rings, clamps, &c.	\$25.00
12 Small and 3 larger labelled bottles	14.50
3 Small plain bottles, not labelled	.45

To hold the following REAGENTS, which we can furnish if desired, at:

2 oz. Nitric acid	\$0.25	2 Watch glasses, 2 inches diameter	\$0.20
2½ oz. Hydrochloric acid.	.23	2 " " 3 " "	.50
2 oz. Acetic acid	.20	2 " " 4 " "	.80
2 oz. Nitroso-nitric acid.	.20	1 Alcohol lamp	.75
2 oz. Nitrate of silver in solution (9.58 gr. in an ounce)	.50	1 Burette graduated in grains	1.98
2 oz. Sulphate of copper in solution (90.5 gr. in an ounce)	.35	1 Plain blowpipe	.50
2 oz. Neutral tartrate of potash in solution (364 gr. in an ounce)	.50		
1 lb. Solution of soda (specific grav. 1.12)	.65		
2 oz. Liquor potassæ	.20		
2½ oz. Liquor ammoniæ	.20		
2 oz. Ether	.25		
1 lb. Mercury (pure)	1.50		
1 lb. Solution of hydrochlorite of soda	1.00		
1 lb. Solution of chloride of sodium (saturated). ..	.35		
Litmus paper, red and blue . . }			
Turmeric paper. }	.15		
German yeast, in cake	.20		

CONTENTS OF THE LARGE DRAWER.

1 Urinometer	\$1.25
1 Thermometer	1.50
4 Porcelain evaporating dishes	1.50

CONTENTS OF THE SMALL DRAWER.

3 Stirring rods	\$0.45
3 Drop tubes	.15
2 Long swabs to clean out the Urea tube	.50
2 Brushes	.44
1 Six ounce graduated glass	.75
1 One " " "	.50
1 One drachm " "	.50
4 Conical glasses with porcelain covers	2.00
6 Test tubes and stand (a commoner article less) ..	3.38
3 Funnels and filtering paper	1.50
3 Flasks and wire gauze	1.50
1 Two hundred grain measure	.60
1 Tube graduated in cubic inches	2.00
1 Vessel in which the graduated tube can be inverted	.60

Amount for the Case and contents. . \$70.45

DIAGNOSTIC.

FOR URINARY EXAMINATIONS.

Flint's Extra Apparatus.

1 Hydrometer of Baumé for liquids heavier than water	\$1.00
1 One thousand grain specific gravity bottle	3.00
1 Five hundred " " " "	2.75
1 One " " " " " "	2.50
1 Water bath	2.50
1 Water oven for drying filters, brass.....	8.00
1 " " " " tin.....	3.25
2 Wash bottles	2.00
1 Delicate balance to turn $\frac{1}{10}$ of a grain.....	11.00
1 Blowpipe, platinum point	3.00
1 Platinum spoon for calculi	4.00
12 Test tubes and stand.....	3.38
1 Book of colored papers, gummed, for recording the color of specimens.....	1.50
1 Bunsen burner and 6 feet rubber tubing	3.00

Graduated solution of chloride of barium (36.6 grains in 6 fluid ounces of water) for quantitative analysis of the sulphates \$0.80

Three separate solutions for quantitative analysis for phosphoric acid:

- 1st. Sesquichloride of iron: 9.33 grains of iron by hydrogen dissolved in hydrochloric in a little nitric acid, evaporated to dryness, and dissolved in 6 fluid ounces of water, in bottle80
- 2d. 400 grains of acetate of soda and 800 grains of acetic acid, dissolved in 6 fluid ounces of water, and bottle..... .50
- 3d. 12 grains of ferrocyanide of potassium, dissolved in 6 fluid ounces of water, and bottle50

Full directions for the use of this and other apparatus are given in Professor Flint's work, "Manual of Chemical Examination of the Urine in Disease," by Austin Flint, Jr., M. D., Professor of Physiology and Microscopy in the Bellevue Hospital Medical College, &c., &c. Also in "A Guide to Urinary Analysis, for the Use of Physicians and Students," by Henry G. Piffard, A. M., M. D., Physician to the Charity Hospital, to the New York Dispensary for Diseases of the Skin, &c., &c. Also in "Lessons in Physical Diagnosis," by Alfred M. Loomis, M. D., Professor of the Institutes and Practice of Medicine in the Medical Department of the University of New York, Physician to Bellevue and Charity Hospitals, &c., &c.

FIG. 1001.—Roberts' Urine Test Apparatus.
On a revolving black walnut Etagere, . . . \$25.

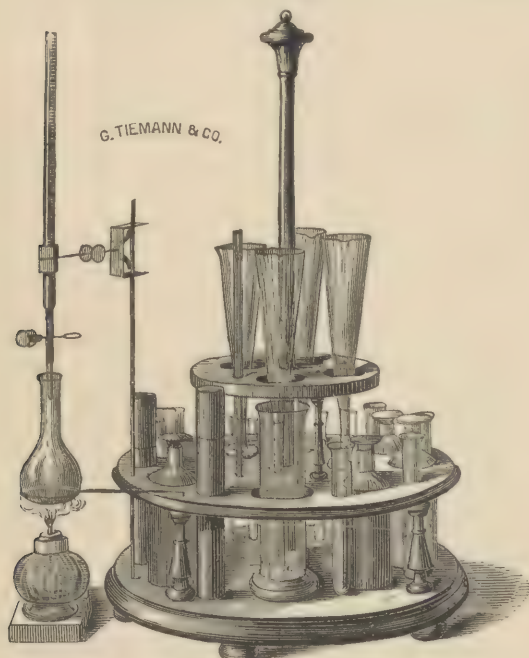
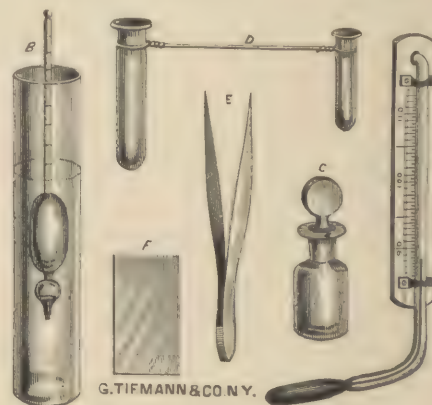


FIG. 1002.—Vance's Urine Test.
In a neat Morocco Case, . . . \$6.



- Contents:
- 2 Test tubes and holder.
 - 1 Urinometer.
 - 1 Acid bottle.
 - 1 Axilla thermometer.
 - 1 Pair brass forceps.
 - Red and blue litmus paper.

Roberts' Urine Test Apparatus, improved by Lewis, consists of the following parts:

- | | | |
|--|-------------------------------|-------------------------------------|
| 1 Set Neubaur's urinometers with two test glasses. | 1 Alcohol lamp. | 3 Pipettes and 3 stirring rods. |
| 4 Urine glasses; 6 Test tubes. | 5 Bottles with pure reagents. | 1 Graduate. |
| | 1 Burette with holder. | 1 Flask with ring support for same. |

DIAGNOSTIC.

FOR URINARY EXAMINATIONS.

FIG. 1003.
Graduated
Measure Glass.



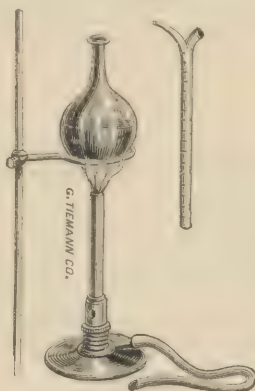
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FIG. 1004.
Urinometer.



G. TIEMANN & CO.

FIG. 1005.—Fehlich's Flask,
Bunsen Burner and Burette.



G. TIEMANN & CO.

FIG. 1006.
Urea Tube.



G. TIEMANN & CO.

FIG. 1007.
Rapid Filtration Apparatus.

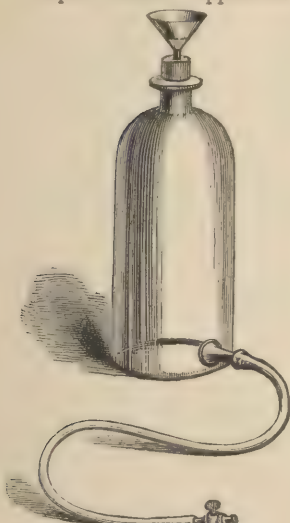


FIG. 1010.—*a.* Mohr's Burette;
b. Stand; *c.* Beaker.

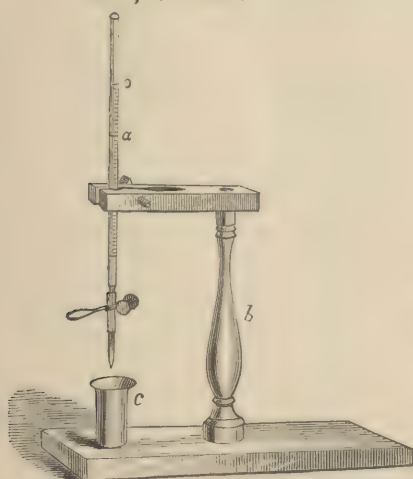
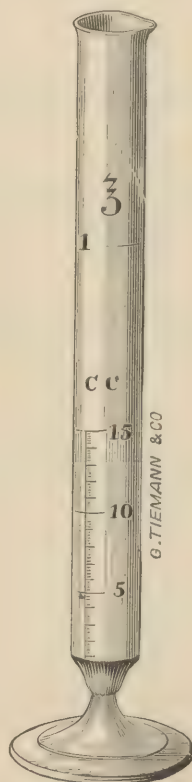


FIG. 1008.
Graduated Tube
for Approximate
Analysis.



G. TIEMANN & CO.

FIG. 1009.
a. Piffard's Measuring Pipette.
b. Arrangement for Fer-
mentation Test.

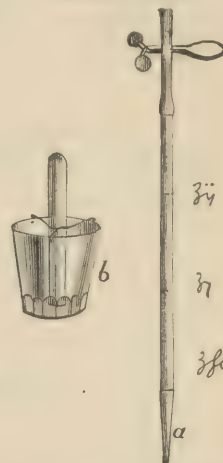
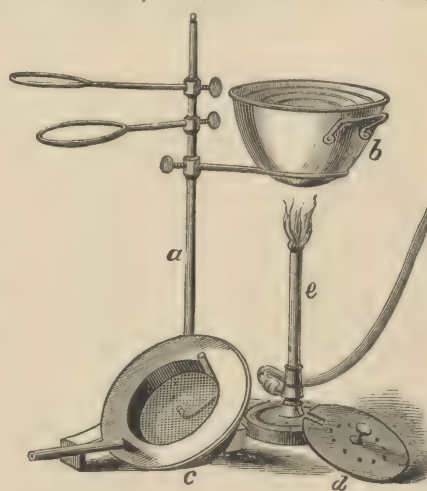


FIG. 1011.—*a.* Retort Stand; *c.* Bunsen Burner;
b. Water Bath, and *d.* Piffard's Water Oven.



See Price List
for enumeration of
Loomis' and Piffard's
Apparatus,
as per page 188, "Loomis'
Physical Diagnosis."

DIAGNOSTIC. CLINICAL THERMOMETERS.

FIG. 1012.—Straight Self-registering Thermometer.

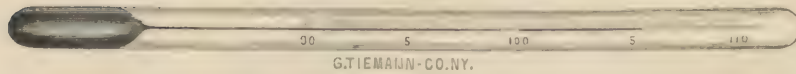


FIG. 1013.—Straight Self-registering Thermometer, with Constriction.



FIG. 1014.—Ivory Scale Axilla Thermometer.

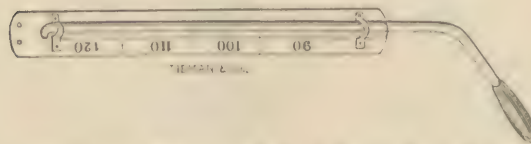


FIG. 1015.—George Tiemann & Co.'s Patent Bent Thermometer.



FIG. 1016.—Surface Thermometer, Fahrenheit Scale.

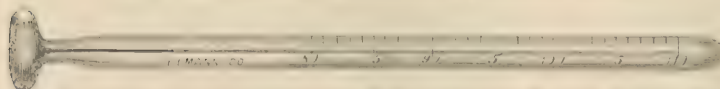


FIG. 1017.—Seguin's Surface Thermometer, Self-registering; Zero at Normal Temperature.

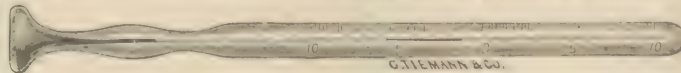


FIG. 1018.—Patent Twisted Stem Thermometer.

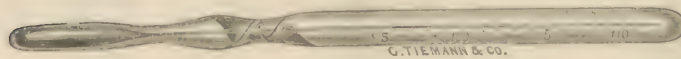


FIG. 1019.—Hick's Patent Lens Thermometer.



Directions for Using Thermometers.

Before making an observation of the temperature of the body, the thermometer should first be examined to ascertain the position of its index. The index is a detached portion of the column of mercury in the tube, separated by a very minute portion of air. If the bulb is warmed, the ascending column of mercury will be seen to push before, but not to touch the index; upon cooling the bulb, the column withdraws and leaves the index at the maximum temperature attained. The index being a portion of the column of mercury, that end of it most distant from the bulb indicates the temperature. If the index is found to be above 98 degrees Fahrenheit it should be shaken down until it is 2 or 3 degrees below that point, say 95 degrees. This may be done by holding the instrument between the thumb and index finger, about the upper fourth of its length in a line continuous with the arm; then raise the forearm until the thermometer is as high as the shoulder, and bring it down with a swing in a line with the body. This motion will have the effect of propelling the index toward the bulb at the rate of two or more degrees for each movement; this should be repeated until the index points below 98 degrees.

Care should be taken in all cases that the part selected for ascertaining the temperature of the body has not been recently subjected to influences likely to lower its temperature. If used beneath the tongue, it must be learned whether the patient has taken any cold drink within the last fifteen minutes, as the local temperature is often reduced some degrees thereby, and if in the axilla, whether it has been exposed by extending the arm, or in any way uncovered.

DIAGNOSTIC. FOR MEDIATE AUSCULTATION.

FIG. 1020.—Flexible Stethoscope.

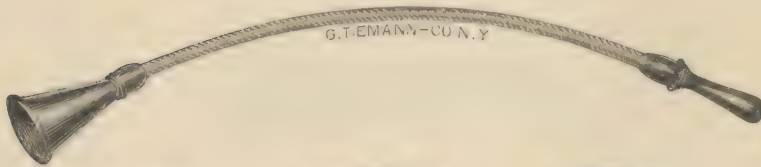


FIG. 1021.—Barclay's Stethoscope.

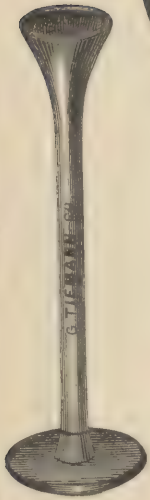


FIG. 1022.—Hawksley's Stethoscope.

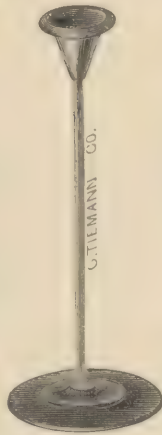


FIG. 1023.—Martin's Combination Stethoscope,
Percussor and Pleximeter.

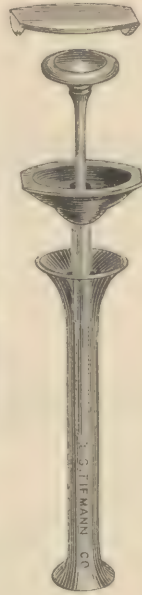


FIG. 1024.—Elliottson's Stethoscope.
Ivory Ear Piece and Pleximeter.



FIG. 1025.—Dobell's Ebony Stethoscope.

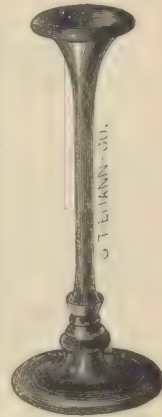


FIG. 1026.—Loomis' Stethoscope (with Rubber Ring,
used as Pleximeter).

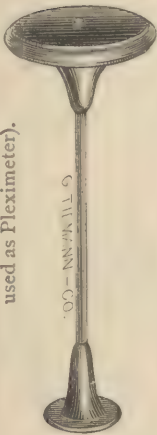


FIG. 1027.—Burrows' Stethoscope.
Vulcanite Ear Piece.

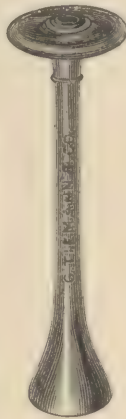


FIG. 1028.—Short Cedar
Stethoscope.



FIG. 1029.—Walsh's Stethoscope. (Dogwood.)



FIG. 1030.—Clark's Stethoscope.

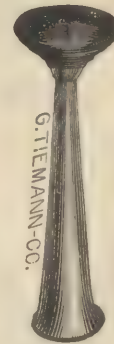


FIG. 1031.—Stokes' Stethoscope.



FIG. 1032.—Cedar Stethoscope.
Hard rubber Ear Piece.

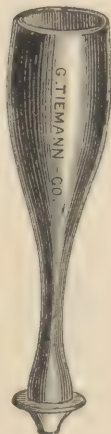


FIG. 1033.—Ferguson's Stethoscope.

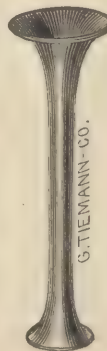


FIG. 1034.—Quain's Telescopic Stethoscope.



FIG. 1035.—Arnold's Flexible Stethoscope.
G. TIEMANN & CO.



DIAGNOSTIC. FOR MEDIATE AUSCULTATION.

FIG. 1036.—Cammann's Stethoscope with Snelling's Rubber Bell.

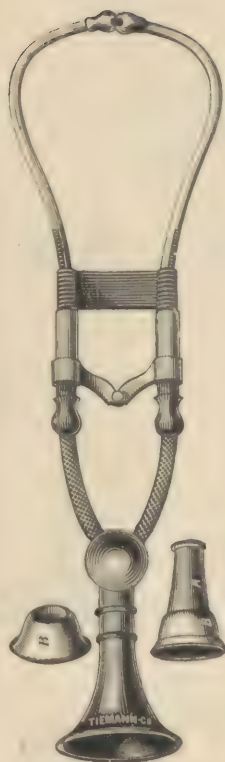


FIG. 1041.—Davis' Stethoscope.

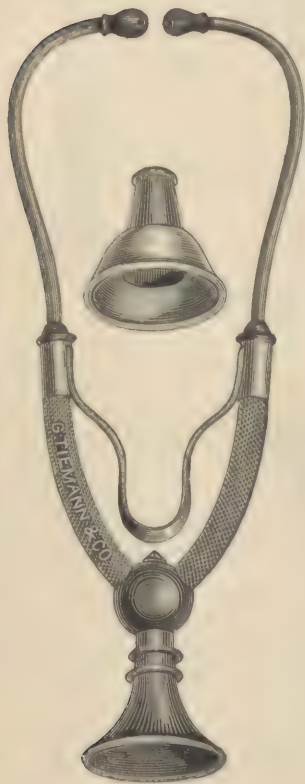


FIG. 1042.—Bartlett's Stethoscope.

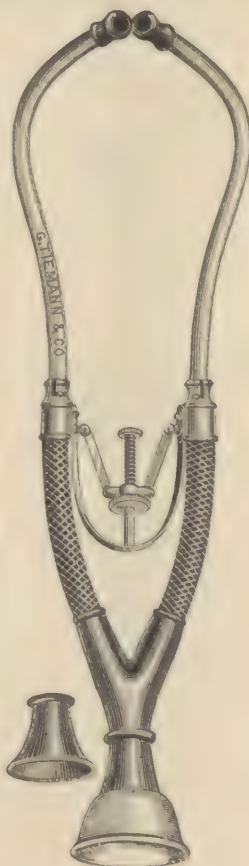


FIG. 1043.—Knight's Stethoscope.

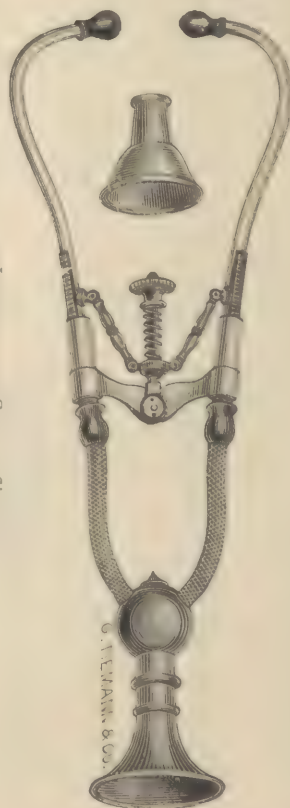


FIG. 1037.—Cammann's Intra-Costal Auscultator.



FIG. 1038.
Cammann's Cylindrical Auscultator.
Solid Cedar.

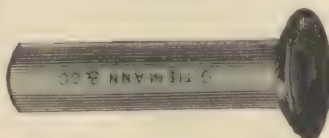
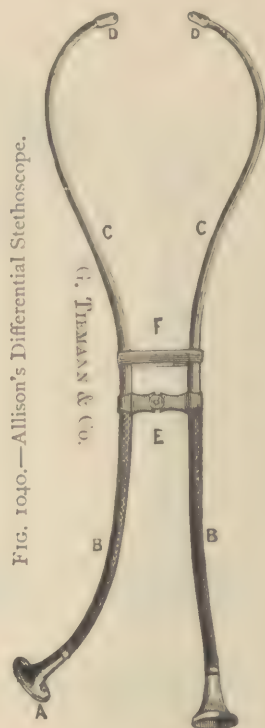


FIG. 1039.—Cedar Stethoscope.
Vulcanite Ear Piece.



FIG. 1040.—Allison's Differential Stethoscope.



DIAGNOSTIC.

FOR MEDIATE AUSCULTATION.

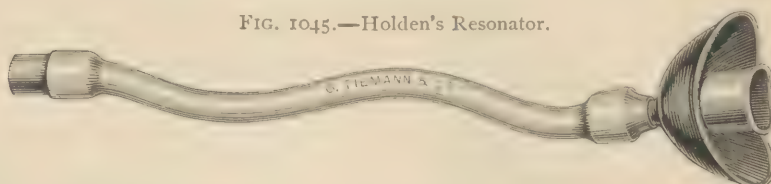
Many other modifications of Cammann's Binaural Stethoscope have been suggested, of which that of Mr. Irvin Palmer deserves special notice. This instrument is adapted for use as calipers and the elastic band of Cammann's is replaced by a circular box spring at the hinge. Attached to the joint is a dial plate, which registers the divergence of the two metal arms—thus at once enabling diametric and other measurements to be accurately and readily made without the addition of a separate instrument. It will recommend itself to the profession for the facility with which it permits anatomical measurements to be registered: as, for example, in estimating the relative expanding power of the two sides of the chest, in lung disease, &c.

London Medical Record, May 15, 1881.

FIG. 1044.—Ware's Stethoscope.



FIG. 1045.—Holden's Resonator.



FOR MEDIATE PERCUSSION.

FIG. 1047.—Hoffmann's Pleximeter.

FIG. 1046.—Flint's Pleximeter.



FIG. 1048.—Glass Pleximeter.



FIG. 1050.—Flint's Percussor.

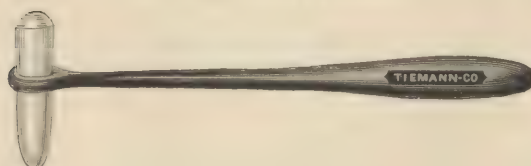


FIG. 1051.—Gerne's Pleximeter.

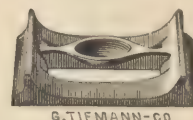


FIG. 1049.—Ivory Pleximeter.



FIG. 1052.—Percussor with Whalebone Stem.

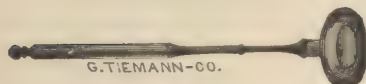


FIG. 1053.—Winterich's Percussion Hammer.



FIG. 1054.—Speir's Echoscope (to intensify sounds produced by percussion).



DIAGNOSTIC.

CYRTOMETRIC.

FIG. 1055.—Flint's Cyrtometer.

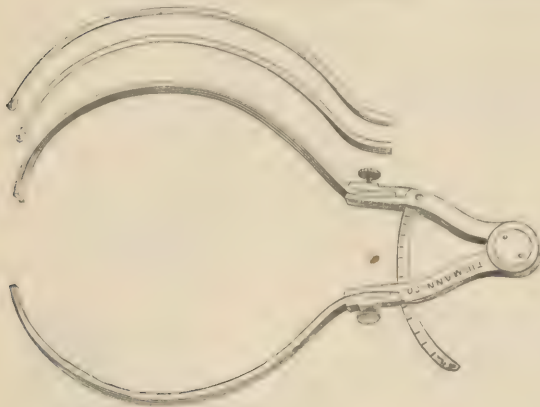


FIG. 1056.—Wood's Cyrtometer.

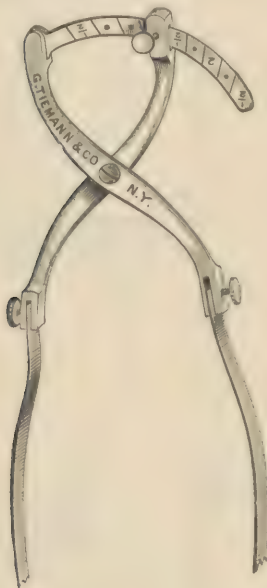
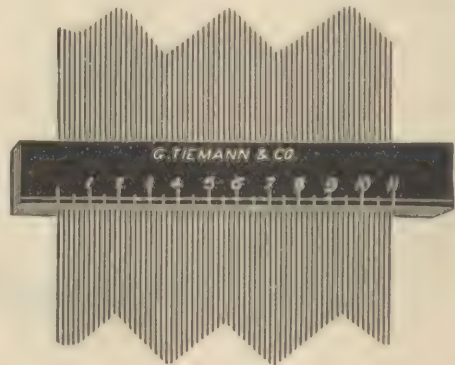


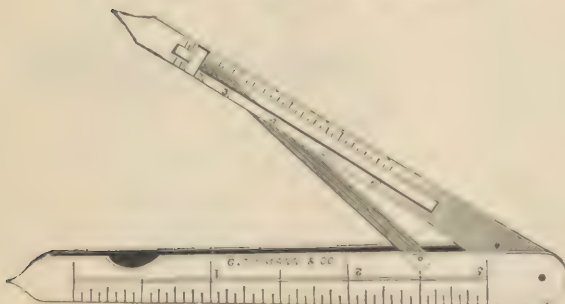
FIG. 1057.—Warren's Conformator.



Warren's Conformator consists of two hard rubber or metal braces, grooved to receive a number of blunt-pointed needles; these needles move easily in the grooves, and when applied to an undulated surface will take the exact shape of the depressions or elevations.

CARDIOMETRIC.

FIG. 1058.—Cammann's Cardiometer.



To determine the distance of the apex beat from the median line, one point of the instrument is placed on the median line and that of the other bar to a point corresponding to the apex beat; by reading the figure marked by the indicator, you determine the number of inches the apex beat is distant from the median line.

The instrument is very small, and when closed presents rounded ends, and may be conveniently carried in the pocket.

For the following special mechanical aids to diagnosis: *i. e.*, ENDOSCOPES, LARYNGOSCOPES, OTOSCOPES, OPHTHALMOSCOPES, PROBES, SOUNDS; and AURAL, NASAL, ORAL, OPHTHALMIC, UTERINE, VAGINAL and ANAL SPECULA, see Index.

DIAGNOSTIC.

DYNAMOMETRIC.

To measure accurately the strength of paralyzed muscles of the upper extremities, to determine the slightest difference in muscular power of the two hands, as well as any changes that may occur, from time to time, in the course of paralysis.—“Physical Diagnosis,” Loomis.

FIG. 1059.—Dynamometer.

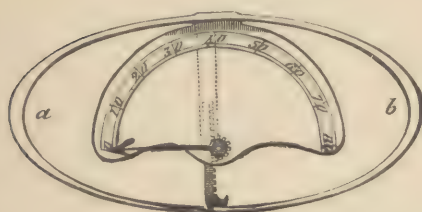


FIG. 1060.—A. McLane Hamilton's Dynamometer.

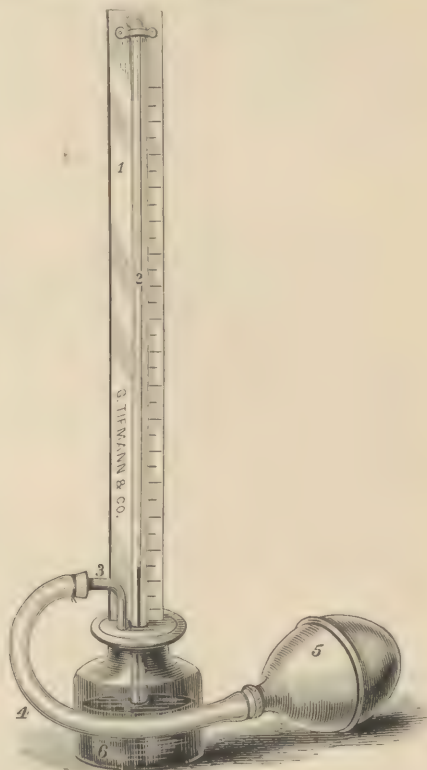
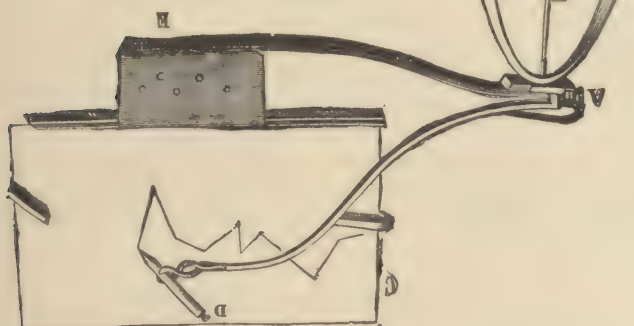


FIG. 1061.—Dynamograph.



For the same purpose as the Dynamometer, with additional contrivance for recording observations.

STETHOMETRIC.

For measuring the extent of movement of the walls of the chest.

FIG. 1062.—Quain's Stethometer.

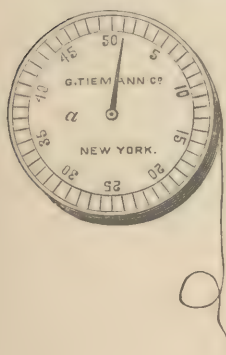
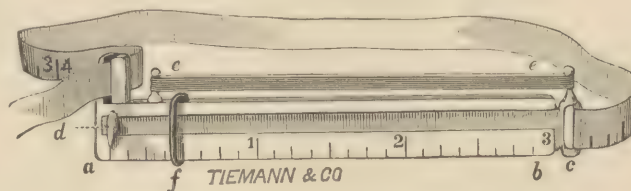


FIG. 1063.—Carroll's Stethometer.



(Extract from *New York Medical Journal*, February, 1868.)

Carroll's Stethometer consists of an outer case, marked with a scale of three inches, *a b*, within which moves a slide, *c d*, bearing a gnomon or indicator, *d*. To the end of this slide is attached an ordinary measuring tape, the first three inches being cut off, so as to render the scale continuous, which is passed around the chest and drawn through the catch at the opposite end of the instrument. As the lungs are inflated, the slide is drawn out and the indicator shows the exact amount of expansion. A hard rubber ring, *f*, sliding easily over the scale, may be used to render the stethometer self-registering; and Messrs. TIEMANN & CO. have added also an elastic band, *e e*, to draw the two portions of the instrument together. This elastic band, if used at all, must be very slight, as I have found that even the thin envelope rings prevent the full expansion of the chest. I therefore remove the band before applying the stethometer, which thus registers itself without the hard rubber slides.

DIAGNOSTIC.

ÆSTHESIOMETRIC.

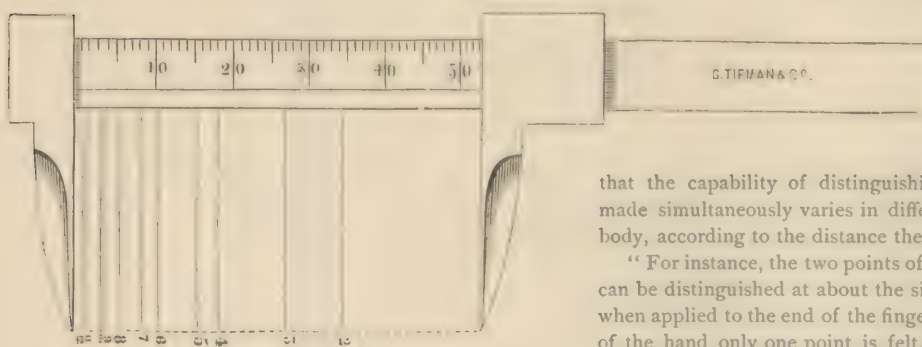
For investigating the condition of the tactile sensibility of patients suspected of having brain disease. The earliest attempt in this direction was made by Dr. Sieveking, of London, who, in 1878, described an instrument for this purpose, which he called an æsthesiometer. This was simply a modification of the common beam-compass employed by carpenters, and is yet in common use among physicians interested in the pathology of the cerebro-spinal organs.

The class of cases in which it is useful were thus enumerated by Dr. Sieveking :

1. "In actual paralysis, to determine the amount and extent of sensational impairment.
2. "As a means of diagnosis between actual paralysis of sensation and mere subjective anæsthesia, in which the tactile powers are unaltered.
3. "As a means of determining the progress of a given case of paralysis for better or for worse.

The diagnostic value of an instrument of this nature, in cases where sensibility is affected, depends upon the fact

FIG. 1064.—Sieveking's Æsthesiometer.



that the capability of distinguishing two impressions made simultaneously varies in different regions of the body, according to the distance they are apart.

"For instance, the two points of a pair of compasses can be distinguished at about the sixth of an inch apart when applied to the end of the finger, while on the back of the hand only one point is felt, though they are an inch apart."

FIG. 1065.—Carroll's Æsthesiometer.

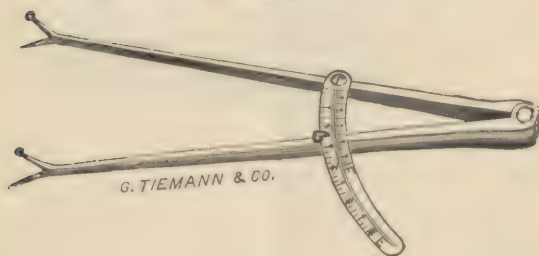


FIG. 1066.—Hammond's Æsthesiometer.

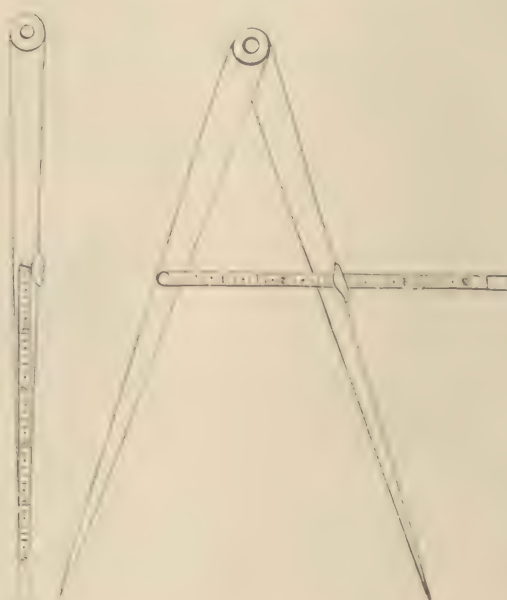
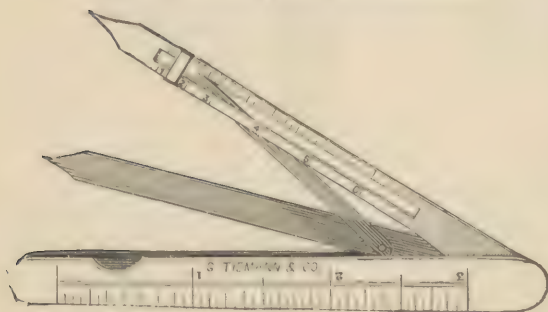


FIG. 1067.—Vance's Pocket Æsthesiometer.



Carroll's Æsthesiometer has each free extremity divided into two points—one blunt, the other sharp. This enables the observer to determine the comparative sensibility to contact and pain at different distances by simply substituting the one pair of points for the other.

DIAGNOSTIC.

ÆSTHESIOMETRIC.

FIG. 1068.—Elsberg's Æsthesiometer (for the Throat).

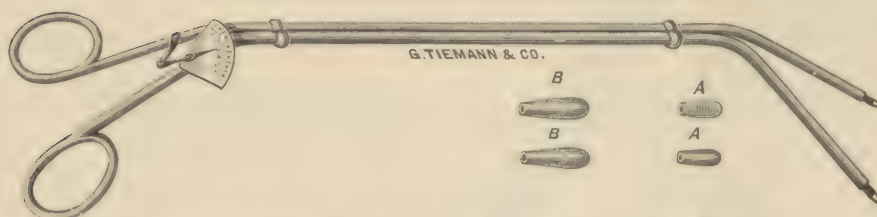


FIG. 1069.—Beard's Piesmeter, for measuring the sense of pressure.



The sense of pressure is strongest on the forehead, tongue and cheek ; next in order come the fingers, back of hand, forearm and arm ; then the anterior portion of the thigh and leg, back of foot and toes. The least sensitive portions are the back of thigh and leg.

On comparison, the relative sensitiveness of different parts of the body to farradization, with the relative acuteness of the sense of pressure, exhibits a remarkable coincidence.

PULSOMETRIC.

Instruments to ascertain and record the quickness, strength, uniformity or irregularity of the pulse. Used for purposes of diagnosis and various physiological investigations.

FIG. 1070.—Dudgeon's Sphygmograph.

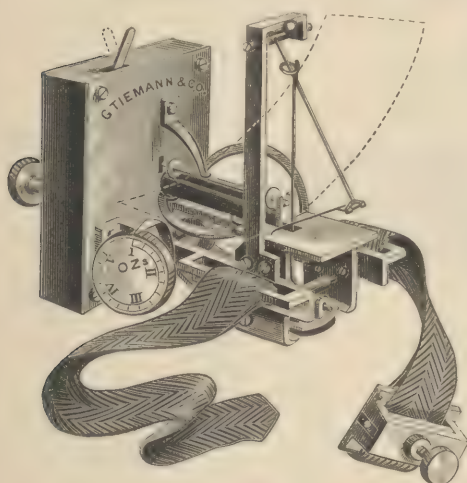


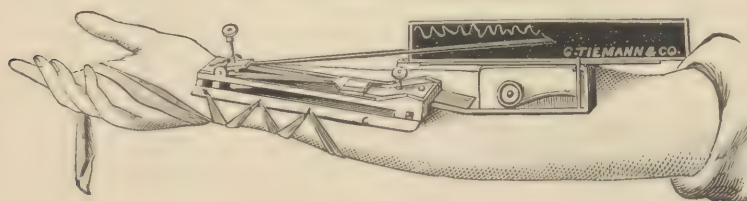
FIG. 1071.—White's Hæmarumascop.



In order to prepare the hæmarumascop for an observation, a fraction of a drop of filtered solution of rose aniline in alcohol, with some essential spirit, must be introduced. The essential spirit is thus employed in combination with a view to its quality to diminish friction within the bore of the tube.

When this instrument is made to rest firmly and steadily upon the trunk of a superficial vein of sufficient dimensions, the peculiar movement of the stream of blood beneath the bowl of the instrument sets the sensitive fluid column within the tube into sympathetic motion, clearly demonstrating that the blood within the vein receives the shock and experiences augmentation of contents nearly isochronous with the arterial throb.

FIG. 1072.—Marey's Sphygmograph.



DIAGNOSTIC.

MICROSCOPICAL.

FIG. 1073.
Transplantation Scissors.
For obtaining minute sections of
fresh tissue for transplan-
tation or for examination.

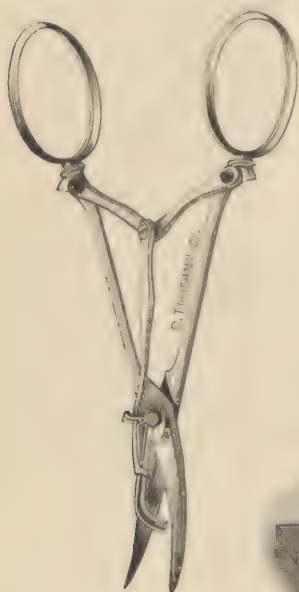


FIG. 1074.—Microscope.



For obtaining minute pieces of
muscle for examination.

FIG. 1075.—Duchenne's Exploring Trocar.



FIG. 1076.—Duchenne's Exploring Trocar (Ivory Handle).



FIG. 1077.—Noeggerath's Exploring Trocar.



FIG. 1078.—Tiemann & Co.'s Exploring Trocar.

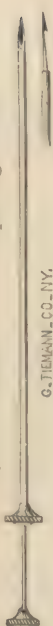


FIG. 1079.—Exploring Trocar.

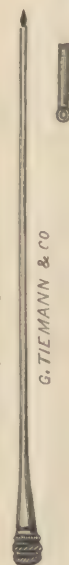


FIG. 1080.—Jewett's Improved Section Cutter.



FIG. 1082.
Valentine's Section Knife.
(Tiemann's Model.)



FIG. 1081.—Curtis' Section Knife and Frame.



DIAGNOSTIC.

MICROSCOPICAL.

For obtaining thin sections of morbid integument for microscopical examination.

FIG. 1083.—Piffard's Cutisector.

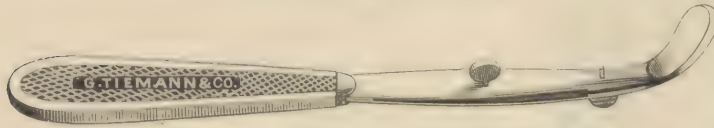


FIG. 1084.—Microscopic Section Knife.



FIG. 1085.—Microscopic Scalpel.



FIG. 1086.—Probe-Pointed Microscopic Bistoury.



FIG. 1087.—Sharp-Pointed Microscopic Bistoury.



FIG. 1088.—Microscopic Pocket Scalpel.

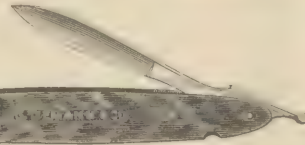


FIG. 1095.—Straight Microscopic Forceps.

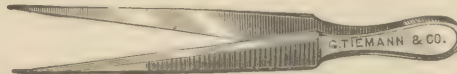


FIG. 1096.—Curved Microscopic Forceps.

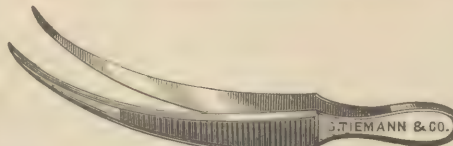


FIG. 1097.—Hard Rubber Microscopic Syringe.



To obtain fluid contained in pleural, pericardial or abdominal cavity, &c., for examination, the Aspirators are useful.

FIG. 1090.—Valentine's Knife (Charrière's Model).



FIG. 1089.—Microscopic Section Razor.

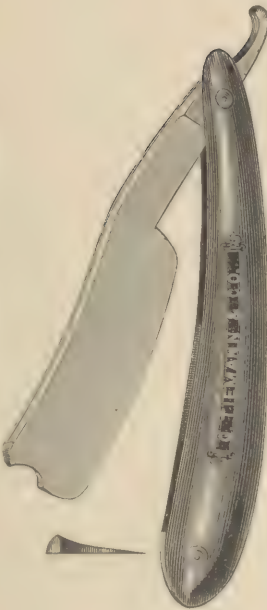


FIG. 1091.—Microscopic Needle Holder.



FIG. 1092.—Microscopic Needle (Straight or Curved).



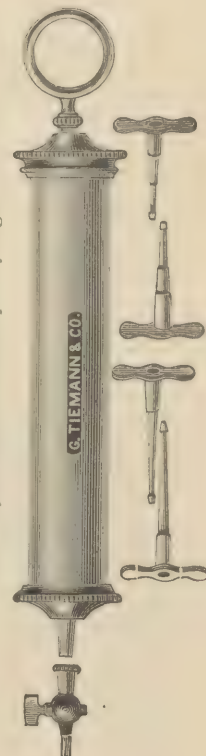
FIG. 1093.—Small Microscopic Knife.



FIG. 1094.—Spear-Pointed Microscopic Knife.



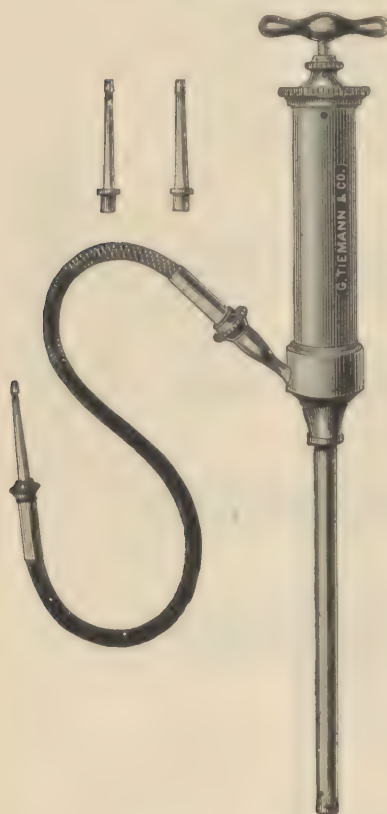
FIG. 1098.—Brass Microscopic Syringe.



POST MORTEM.

EMBALMING.

FIG. 1099.—Embalming Pump.



THE ART OF EMBALMING originated in Egypt over 3000 years ago. The invention was ascribed by the Egyptians to Anubis the son of Osiris, who is said to have performed the office for his father. In recent times, considerable attention has been devoted to the subject and various processes and compounds have been devised.

Gaural injected the veins with sulphate of alumina. Falconi injected into the body sulphate of zinc. Chloride of zinc and sulphate of soda are also sometimes used.

Dr. Wywodzoff, of St. Petersburg, Russia, recommends thymol diluted with water and glycerine.

℞. Thymolis.	sc. ij.
Glycerine,	lbs. iv.
Aq.	lbs. ij.

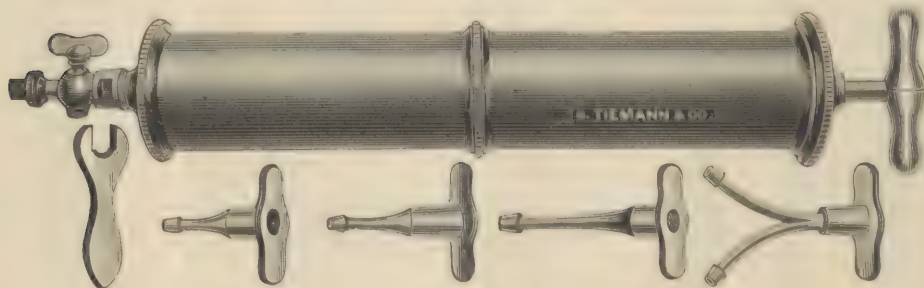
GERMAN PROCESS.—The dead bodies of human beings and animals are said to fully retain their form, color, and flexibility by this process. Even after a period of years such dead bodies may be dissected for purposes of science and clinical jurisprudence. Decay and the offensive smell of decay are completely prevented. Upon incision the muscular flesh shows the same appearance as in the case of a fresh dead body. Preparations made of the several parts, such as natural skeletons, lungs, entrails, &c., retain their softness and pliability.

The liquid used is prepared as follows: in 3000 grams of boiling water are dissolved 100 grams of alum, 25 grams of cooking salt, 12 grams saltpetre, 60 grams potash, and 10 grams arsenious acid. This solution is then allowed to cool and filter; to 10 litres of this neutral, colorless, odorless liquid, 4 litres glycerine and one litre methylic alcohol are to be added. The process of preserving or embalming dead bodies by means of this liquid consists as a rule in saturating and impregnating the bodies with it. From 1½ to 5 litres of liquid are used for a body, according to its size.

Anatomical preparations that are to be preserved dry are immersed in the fluid from six to twelve days, according to their size; then taken out and dried in the open air. Hollow organs, such as the lungs, &c., must be filled with the preserving liquid, then laid in a vessel containing the same fluid, and afterwards distended with air and dried. Small animals, such as crabs, beetles, lizards, frogs, &c., if the natural colors are to be preserved, are not to be dried, but put immediately into the preparation.

The Embalming Pump (fig. 1099) is made of brass, nickel-plated and put up in a black walnut case, lined with velvet \$22.00

FIG. 1100.—Anatomical Syringe.



Brass Syringe.

1 Double injection Pipe.

3 Different sizes single Pipes.

1 Stop-cock.

1 Key Wrench to fasten and detach the stop-cock.

1 Mahogany Case lined with velvet \$35.00

POST MORTEM AND DISSECTING.

FIG. 1102.—Dissecting Forceps.

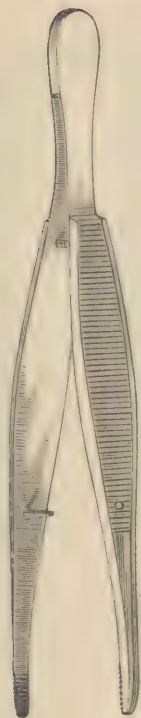


FIG. 1103.—Steel-Handle Cartilage Knife.



FIG. 1104.—Dissecting Hook (Steel Handle).



FIG. 1105.
Dissecting
Scissors.

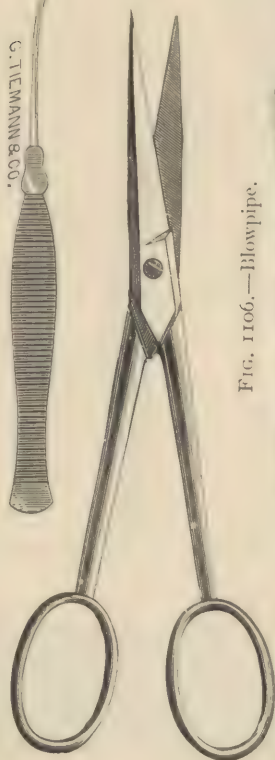


FIG. 1107.—Enterotome.

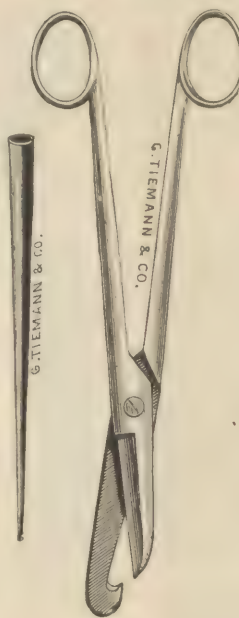


FIG. 1108.—Coxeter's Dissecting Forceps.



FIG. 1109.—Finnell's Knife, Saw and Handle.

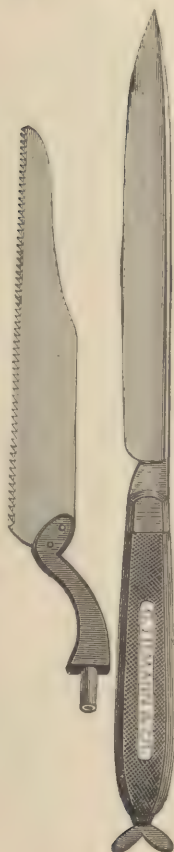


FIG. 1110.—Brain Knife.



FIG. 1111.—Reamer.

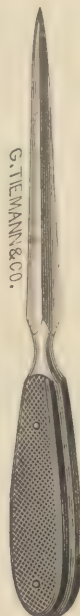


FIG. 1112.—Warren's Demonstrating Knife.



FIG. 1113.—I Post-mortem saw, I Knife and I Handle.



POST MORTEM AND DISSECTING.

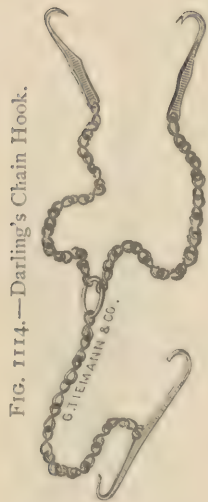


FIG. 1114.—Darling's Chain Hook.

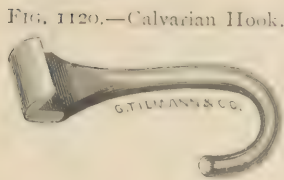


FIG. 1120.—Calvarian Hook.

FIG. 1115.—Rachitome, Chisel.

FIG. 1116.
Post Mortem
Hammer.

FIG. 1117.—Costotome, Chisel.

FIG. 1118.—Satterthwaite's
Rachitome.

FIG. 1119.—Chisel.

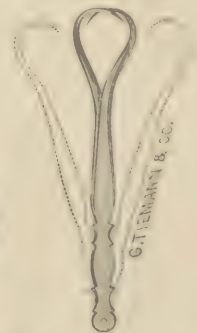
FIG. 1121.—Dissecting
Double Hook.

FIG. 1122.—Double Rachitome.

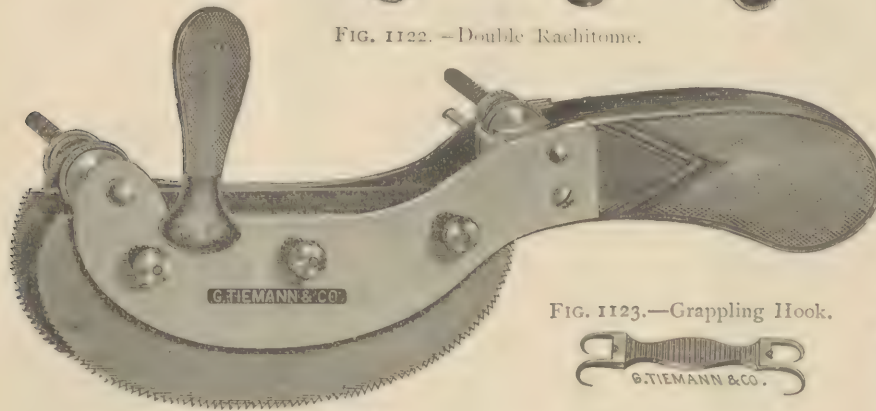


FIG. 1123.—Grappling Hook.

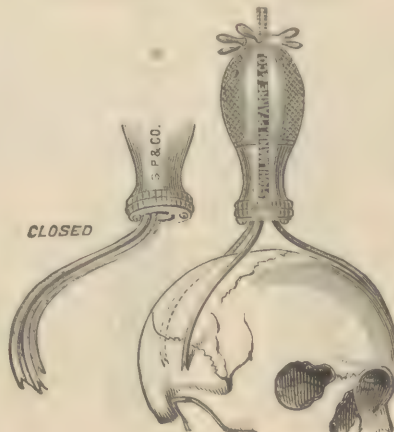
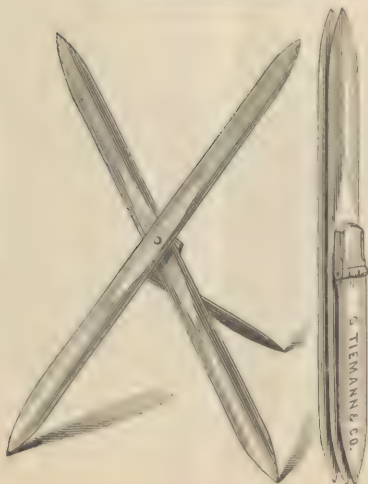
FIG. 1125.
Satterthwaite's Calvarian Clamp.

FIG. 1126.—Chain Hook.



FIG. 1124.—Tripod Head-Rest.



POST MORTEM AND DISSECTING.

AUTOPSY OR POST MORTEM EXAMINATION SETS.

No. 1 Post Mortem Set.

PRICE, \$28.00.

- 1 Hammer.
- 1 Costotome (Rib Shears).
- 1 Ebony Handle Cartilage Knife.
- 2 Ebony Handle Scalpels, assorted.
- 1 Steel Handle Dissecting Hook.
- 1 pair of Coxeter's Dissecting Forceps.
- 1 Enterotome.
- 1 set of Heavy Chain Hooks.
- 1 pair of Straight Scissors.
- 1 Saw.
- 1 Amputating Knife.
- 1 Handle to fit the Saw and Knife.
- 1 Chisel.
- 1 Reamer.
- 2 Needles, Thread and Wax.
- 1 Mahogany Case, with a slide or lock, lined with velvet.

No. 2 (Hutchison's) Post Mortem Set.

PRICE, \$24.00.

- 1 Amputating Knife.
- 1 Saw.
- 1 Handle to fit the above.

- 1 Chisel.
- 1 pair of Straight Dissecting Scissors.
- 1 set of Chain Hooks.
- 1 pair of Dissecting Forceps.
- 1 Aneurism Needle.
- 1 Metacarpal Saw.
- 3 Ebony Handle Scalpels, assorted.
- 1 Steel Director.
- 1 Probe-pointed Bistoury.
- 1 Hammer.
- 1 Steel Handle Dissecting Hook.
- 1 Ebony Handle Cartilage Knife.
- 1 German Silver Blowpipe.
- 2 Needles, Silk and Wax.
- 1 Rosewood Case, with lock and key, lined with velvet.

No. 3 Post Mortem Set.

PRICE, \$22.00.

- 1 Hammer.
- 1 Costotome Chisel.
- 1 Steel Handle Cartilage Knife.
- 1 Ebony Handle Scalpels, assorted.
- 1 Steel Handle Dissecting Hook.
- 1 pair of Plain Dissecting Forceps.
- 1 Enterotome.
- 1 set of Heavy Chain Hooks.

- 1 German Silver Blowpipe.
- 1 Plain Chisel.
- 1 pair of Straight Dissecting Scissors.
- 1 Amputating Knife.
- 1 Saw.
- 1 Handle to fit the Knife and Saw.
- 2 Needles, Thread and Wax.
- 1 Mahogany Case, with a slide or lock, lined with velvet.

Finnel's Post Mortem Set.

PRICE, \$12.50.

- 1 Amputating Knife.
- 1 Saw.
- 1 Handle to fit the above.*
- 3 Ebony Handle Scalpels, assorted.
- 1 Steel Handle Cartilage Knife.
- 1 pair of Straight Dissecting Scissors.
- 1 Ebony or Steel Handle Tenaculum.
- 1 set of Heavy Chain Hooks.
- 1 German Silver Blowpipe.
- 1 pair of Dissecting Forceps.
- 2 Needles and Thread.
- 1 Chisel.
- 1 Rosewood Case, with lock and key, lined with velvet.

STUDENTS' DISSECTING SETS.

No. 1 Dissecting Set.

PRICE, \$8.00.

- 1 Steel Handle Cartilage Knife.
- 4 Ebony Handle Scalpels, assorted.
- 1 Steel Handle Dissecting Hook.
- 1 German Silver Blowpipe.
- 1 pair of Straight Dissecting Scissors.
- 1 pair of Dissecting Forceps.
- 1 set of Chain Hooks.
- 1 Chisel.
- 1 Mahogany or Rosewood Case, with lock and key, neatly arranged, lined with velvet.

No. 2 Dissecting Set.

PRICE, \$7.00.

- 1 Steel Handle Dissecting Hook.
- 4 Ebony Handle Scalpels, assorted.
- 1 Steel Handle Cartilage Knife.
- 1 set of Wire Chain Hooks.
- 1 pair of Dissecting Forceps.
- 1 pair of Straight Dissecting Scissors.
- 1 German Silver Blowpipe.
- 1 Mahogany Case, lined with velvet.

No. 3 Dissecting Set.

PRICE, \$6.25.

- 1 Steel Handle Dissecting Hook.
- 3 Ebony Handle Scalpels, assorted.
- 1 Steel Handle Cartilage Knife.
- 1 set of Wire Chain Hooks.
- 1 pair of Dissecting Forceps.
- 1 pair of Straight Dissecting Scissors.
- 1 German Silver Blowpipe.
- 1 Mahogany Case, lined with velvet.

No. 4 Dissecting Set.

PRICE, \$6.00.

- 1 Steel Handle Cartilage Knife.
- 3 Ebony Handle Scalpels, assorted.
- 1 Steel Handle Dissecting Hook.
- 1 set of Wire Chain Hooks.
- 1 pair of Dissecting Forceps.
- 1 pair of Straight Dissecting Scissors.
- 1 Mahogany Case, lined with velvet.

No. 5 Dissecting Set.

PRICE, \$5.50.

- 1 German Silver Blowpipe.
- 2 Ebony Handle Scalpels.
- 1 Steel Handle Dissecting Hook.
- 1 Steel Handle Cartilage Knife.
- 1 pair of Dissecting Forceps.
- 1 pair of Straight Dissecting Scissors.
- 1 set of Wire Chain Hooks.
- 1 Mahogany Case, lined with velvet.

No. 6 Dissecting Set.

PRICE, \$5.25.

- 2 Ebony Handle Scalpels.
- 1 Steel Handle Dissecting Hook.
- 1 Steel Handle Cartilage Knife.
- 1 pair Dissecting Forceps.
- 1 pair of Straight Scissors.
- 1 set of Wire Chain Hooks.
- 1 Mahogany Case, lined with velvet.

Darling's Dissecting Set.

PRICE, \$5.75.

- 3 Darling's Scalpels, ebony handles, assorted.

- 1 set of Adjustable Chain Hooks.
- 1 pair of Coxeter's Dissecting Forceps.
- 1 pair of Curved up Dissecting Scissors.
- 1 Mahogany Case, lined with velvet.

Microscopic Dissecting Set.

PRICE, \$15.00.

- 1 Needle Holder.
- 6 Needle Points.
- 1 Section Knife.
- 1 Fine Lacerating Needle.
- 1 Heavy Lacerating Needle.
- 3 Ebony Handle Microscopic Scalpels, assorted.
- 1 pair of Straight and Delicate Microscopic Dissecting Forceps.
- 1 pair of Curved, Delicate Microscopic Dissecting Forceps.
- 1 pair of Straight, Delicate Scissors.
- 1 pair of Delicate Scissors, curved on the flat.
- 1 Neat Rosewood Case, lined with silk velvet.

Our Patent Dissecting Case.

PRICE, \$3.50.

- 1 Steel Handle Cartilage Knife.
- 3 Ebony Handle Scalpels.
- 1 Steel Handle Dissecting Hook.
- 1 set of Wire Chain Hooks.
- 1 pair of Dissecting Forceps.
- 1 pair of Straight Dissecting Scissors.
- 1 Blowpipe.
- 1 Strap to sharpen the scalpels.
- 1 Black Walnut Case.

PHYSIOLOGICAL EXPERIMENTS.

Flint's Armamentarium.

Complete set, \$70.00.

- | | |
|--|---|
| 1 Portal Vein Ligator. | 1 pair medium Dissecting Forceps. |
| 1 pair Bone Forceps, for opening spinal canal. | 1 pair short Dissecting Forceps. |
| 1 Hey's Saw, for opening spinal canal. | 1 Enterotome. |
| 1 pair Forceps, for extirpating the spinal accessory nerve. | 1 Blowpipe, with mouth-piece, stop-cock and 2 points. |
| 1 Drill, for breaking up medulla oblongata. | 1 Lifting-Back Saw, 9 inches long. |
| 1 pair Bone Forceps, shear handles. | 1 Lifting-Back Saw, 7½ inches long. |
| 2 Blunt Hooks, for hooking up roots of spinal nerves. | 1 pair Scissors—one probe-point, the other sharp. |
| 2 Knives, for intra-cranial division of the root of the fifth nerve. | 2 pair Pointed Scissors. |
| 2 Piques, for irritation of the floor of the fourth ventricle. | 3 Langenbeck's Steel Serresfines. |
| 1 Bull-dog Forceps, for drawing out the stomach in making a gastric fistula. | 1 Heavy Cartilage Knife. |
| 2 Gastric Fistula Tubes. | 3 Scalpels, assorted sizes. |
| 1 Catheter, for catheterizing the right side of the heart. | 1 Probe-pointed Bistoury. |
| 2 Dissecting Tenacula, steel handles. | 3 Microscopic Needles, each in handle. |
| 1 pair long-pointed Dissecting Forceps. | 1 Tenotome. |
| | 1 Artery Needle. |
| | 1 Mahogany Case, lined with oil-dyed velvet. |

Flint's Armamentarium for Physiological Experiments.

FIG. 1127.—Portal Vein Ligator.



FIG. 1128.—Hey's Saw.



FIG. 1132.
Bone Forceps, for
opening spinal canal.

FIG. 1133.
Bone Forceps.



FIG. 1131.
Gastric Fistula Tubes.

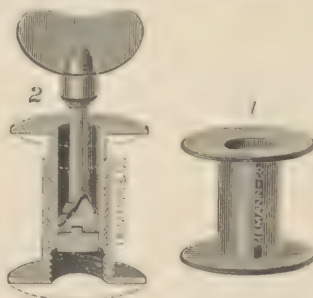


FIG. 1129.—Drill, for breaking up medulla oblongata.



FIG. 1130.—Forceps, for extirpating the spinal accessory nerve.



FIG. 1134.—Bull-dog Forceps, for drawing out the stomach in making a gastric fistula.

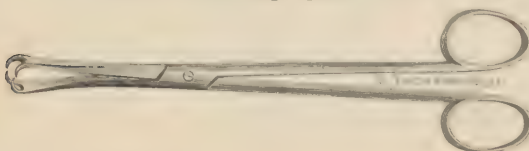


FIG. 1135.—Probe-pointed Scissors.



PHYSIOLOGICAL EXPERIMENTS.

Flint's Armamentarium for Physiological Experiments (continued).

FIG. 1136. Cartilage Knife (stout).



FIG. 1138.—Blunt Hooks, for hooking up roots of spinal nerves.



FIG. 1139.—Knives, for intra-cranial division of the root of the fifth nerve.



FIG. 1140.—Piques, for irritation of the floor of the fourth ventricle.



FIG. 1141.—Short Dissecting Forceps.



FIG. 1142.—Medium Dissecting Forceps.



FIG. 1143.—Long-pointed Dissecting Forceps.



FIG. 1144.—Blowpipe: 2 points, Mouth-piece and Stop-cock.

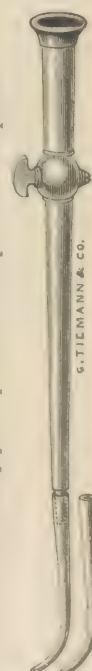


FIG. 1145.—Lifting-back Saw.

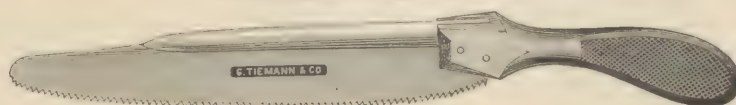


FIG. 1137.—Catheter, for catheterizing the right side of the heart.



MEDICINE CASES.

Robert M. Fuller, M. D., of New York, on Pocket Medicine Cases.

"The frequent need which physicians experience of having at hand, in night calls and emergencies, the necessary means of affording prompt relief, has suggested the designing of a pocket case which shall possess the following important features essential to render it of practical utility at the bedside, viz.: accuracy in dispensing, the ready and proper labeling of the medicines dispensed, as well as of the vials in the pocket case, and lastly, compactness and durability of case.

ACCURACY IN DISPENSING.

For Standard Liquid Preparations, such as those manufactured by E. R. Squibb, M. D., of Brooklyn, N. Y., accurate dispensing can be secured by the use of a minim pipette or minim measure. The former may prove more convenient when dispensing 5, 10 or 15 minims, and the latter when dispensing 20, 30 or 40 minims.

MEDICINE CASES.

Robert M. Fuller, M. D., of New York, on Pocket Medicine Cases (continued).

When it is desirable to dispense powders, it will be found that the so-called compressed pills (or compressed powders), such as Pil: Calomel, gr. V., or Pil: Morphine sulphatis, gr. $\frac{1}{2}$, manufactured by Wyeth & Bro., of Philadelphia, can be easily reduced to powder by gentle pressure and subdivided if desired.

When pills are used, medium-sized ones will be best suited to the vials.

READY AND PROPER LABELING OF MEDICINES DISPENSED, AS WELL AS OF THE VIALS IN THE POCKET CASE.

By writing the date and directions plainly upon an adhesive label—which may also be inscribed with the number and name of the patient—the latter can readily be attached to the covered glass containing the medicine dispensed, thus preventing errors by supplying a complete prescription.

Physicians who preserve a copy of their prescriptions, can also retain copies of those thus given.

The envelopes for powders or pills being also printed with number, date and directions, copies of them can be preserved with equal facility.

A double sheet of adhesive labels, eighty-eight of which are printed and twenty-two blank, should accompany each case.

COMPACTNESS AND DURABILITY OF CASE.

The style, size and finish of a pocket case is a matter of convenience or taste. In this instance, the "box" case has been selected, and its *thickness* reduced to the *minimum*, so that it is not only neat in appearance, but also convenient to carry on all occasions. From its construction it would seem to be the most durable, the easiest opened and closed, and best calculated to protect its contents from injury. It is encased in durable leather and provided with the finest kind of spring-catch.

Lastly, the size of the vial selected, a medium 5ij, renders it well adapted for liquids, pills, or powders, and of sufficient size for ordinary occasions. If, however, larger sizes are required, duplicate vials might prove preferable to some of double size.

Any number of vials being once labelled, selection can be made from them as desired, and the case re-arranged at pleasure."

Adhesive Vial Labels for Fuller's Pocket Medicine Cases.

The sheet of labels previously referred to, embraces the appended list of Squibb's Preparations, from which each physician can readily select those medicines which would prove most useful in cases of emergency.

Fluid Extract of

Aconite Root.
American Hellebore, or Veratrum Viride.
Aromatic Powder.
Belladonna Leaf.
Belladonna Root.
Buckthorn Bark.
Digitalis.
Ergot.
Gelsemium.
Indian Hemp.
Ipecacuanha.
Nux Vomica.
Podophyllum.
Rhatany.
Rhubarb.
Senna Compound.
Valerian.

(1 minim of each of above represents 1 grain.)

Solution of

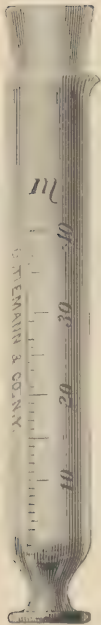
Chloral, 1 grain to the minim.
Sulphate of Morphia, Magendie's, $\frac{1}{80}$ grain to the minim.
Sulphate of Atropia, 4 grains to the fluid ounce.

Sulphate of Quinia, $\frac{1}{2}$ grain to the minim.
Sulphate of Zinc, 10 grains to 30 minims.
Subsulphate of Iron.
Compound Tincture of Ipecacuanha, each minim equal to 1 grain of Dover's Powder.
Deodorized Tincture of Opium.
Compound Solution of Opium.
Compound Tincture of Opium, or Diarrhœa Mixture.
Compound Spirit of Ether, or Hoffman's Anodyne.
Purified Chloroform.
Tincture of Chloride of Iron.
Pills of Aloe and Mastic, Lady Webster's Dinner Pills.
Pills of Arsenious Acid, $\frac{1}{80}$ grain in each pill.
Pills of Opium, 1 grain each.
Pills of Sulphate of Quinia, 3 grains each.
Pills of Sulphate of Quinia, 2 grains each.
Pills of Sulphate of Quinia, 1 grain each.
Compound Cathartic Pills.
Mercurial, or Blue Pills.
Podophyllum Pills.
Compound Pills of Scammony, or Triplex Pills.
Nitrite of Amyl.
Calomel.
Mercury with Chalk.

MEDICINE CASES.

FIG. 1146.—Fuller's Pocket Medicine Cases, designed for Squibb's Standard Pharmaceutical Preparations.

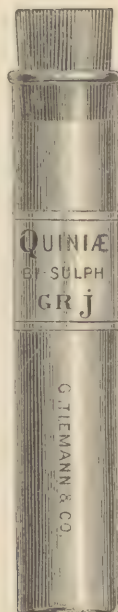
No. 2.—Minim Measure.



No. 3.—Pocket Case Vial.



No. 4.—Pocket Case Vial, for Tablets.



No. 1.—Minim Pipette.



Pocket Medicine Case.
Style 1.



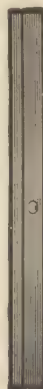
Size, $4\frac{5}{8} \times 3\frac{1}{4} \times \frac{3}{4}$ in.

Pocket Medicine Case.
Style 4.



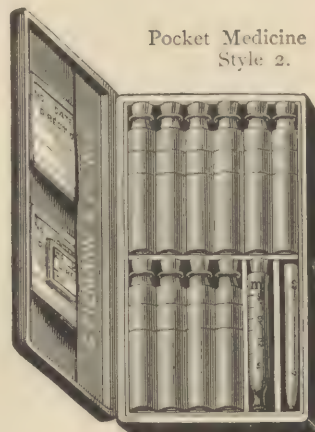
Size, $9 \times 3\frac{1}{4} \times 1\frac{3}{4}$ in.

Pocket Medicine Case.
Style 3.



Size, $7\frac{1}{8} \times 3\frac{1}{4} \times \frac{3}{4}$ in.

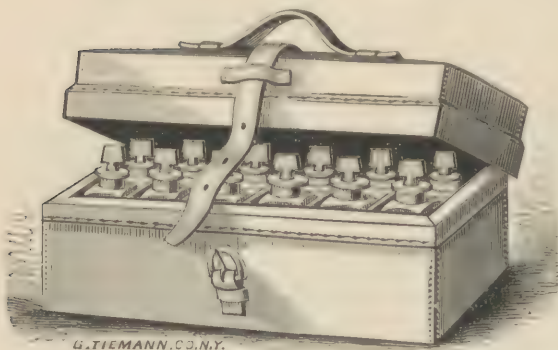
Pocket Medicine Case.
Style 2.



Size, $6\frac{3}{4} \times 3\frac{1}{4} \times \frac{3}{4}$ in.

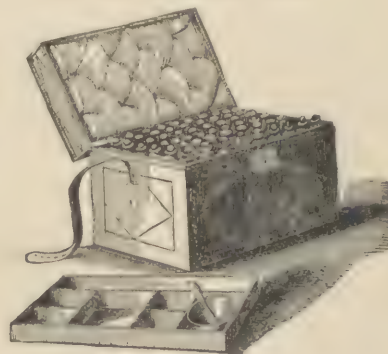
MEDICINE CASES.

FIG. 1147.—Medicine Chest.



G. TIEMANN, C.D.N.Y.

FIG. 1148.—Medicine Chest.



Made of the best Russet Leather.

No. 1 contains 2 Jars and 20 Vials.
 " 2 " 3 " " 28 "

No. 3 contains 4 Jars and 35 Vials.
 " 4 " 12 1 oz Vials, glass stoppers.

MEDICAL SADDLE BAGS.

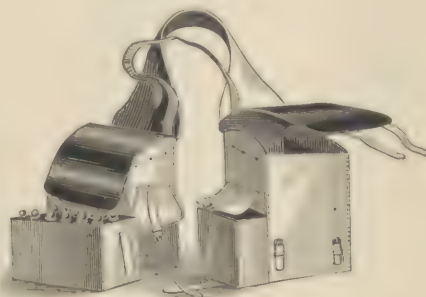
FIG. 1149.—Saddle Bag.



Flat Pattern.

- 16 1½ oz. Vials, Glass Stoppers, Russet Leather, Patent Leather Flaps.
 20 1½ oz. Vials, Glass Stoppers, Russet Leather, Patent Leather Flaps.
 24 1½ oz. Vials, Glass Stoppers, Russet Leather, Patent Leather Flaps.

FIG. 1150.—Saddle Bag.



Made of the best Russet Leather, Patent Leather Covers, space for Instruments under the Cover, Walnut Drawers in lower part.

- 16 1½ oz. Vials, Glass Stoppers.
 20 1½ " " " "
 24 1½ " " " "

PHYSICIANS' HAND BAG.

FIG. 1151.—Saddle Bag.



Box Pattern, with Trays to lift out.

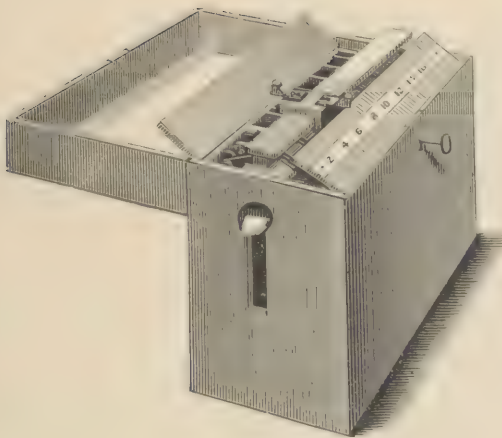
- 16 1 oz. Ground Stop Bottles.
 20 1 " " " "
 24 1 " " " "

FIG. 1152.



ELECTRO-THERAPEUTIC.

FIG. 1153.—Stoehrer's Galvanic Battery (Constant Current).



(Abridged from Beard & Rockwell's work on Medical and Surgical Electricity.)

HOW THE BATTERY IS CONSTRUCTED AND USED.—This battery is composed of plates of zinc and carbon in a solution of bichromate of potass, sulphuric acid and water. The solution is contained in glass jars that are raised up to the plates of zinc and carbon by the keys at the ends of the box. When the jars are raised by the keys to the top of the box, *turn the keys at right angles* and the jars will stay in position. The battery is now ready for use, if the jars are properly filled with the solution. By means of the slide on the top, the current can be increased two cells at a time, as indicated by the graduated plane at the side.

When the battery is not in use the jars should be let down from the plates by means of the keys. If allowed to remain immersed day after day the battery will rapidly lose its strength.

HOW TO CHARGE THE BATTERY.—The solution is made in about the following proportions: sulphuric acid, 1 oz.; bichromate potass, $1\frac{1}{2}$ oz.; water, 10 oz. The best way to make the solution is to dissolve the bichromate of potass in cold water and then add the sulphuric acid. The mingling of the water and sulphuric acid causes great heat. Do not use the solution until it is cool.

Lift out the plates by the middle piece to which they are attached, lift up the jars by the keys and fill each jar with two, or three, or three and a half ounces of the solution. They should be filled pretty uniformly, and care taken that no more is put in than the jar will hold after the plates are immersed.

HOW TO CLEAN THE BATTERY AND AMALGAMATE THE ZINCS.—Every few weeks or months, according to the extent to which the battery is used, it will be necessary to wash the plates and scrape off the incrustations and renew the solution, or, at least, to add more acid or water, and amalgamate the zincs. A good way to amalgamate the zincs is, take a strip of zinc, dip it in a solution of sulphuric acid and water, then dip it in mercury; the mercury will adhere to and run over it; then rub it up over the surface of the zincs of the battery until all are well covered with mercury. During the process of amalgamation the zincs should be kept well moistened with a solution of sulphuric acid and water. The *brass work* of the battery should be *kept clean and bright*, so that the current may flow readily.

HOW TO TELL THE STRENGTH OF THE CURRENT.—Those who have no galvanometer can tell whether the current is running and how strong it is by putting one pole in the hollow of the hand and the other between the thumb and forefinger. The poles should be of sponge, wet with salt-water or simple warm water. Those who have been accustomed only to the noisy and violent faradic (induced) current, will be disappointed to find that this galvanic current causes only a *slight burning sensation*, with no shocks, except when interrupted. A current that is scarcely felt when applied in the hand, may be too strong to apply to the head, or face, or neck. *The greatest mistakes are made by using the galvanic current too strong.*

HOW TO DISTINGUISH THE POLES.—The current is felt strongest at the **NEGATIVE POLE**. When both poles are dipped in a solution of iodide of potassium, the brown color of the iodine appears at the **POSITIVE POLE**.



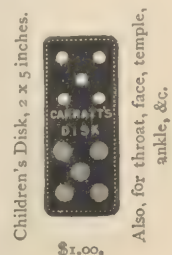
FIG. 1154.—Carratt's Electric Disk.

Flexible, self-acting, comfortable, vitalizing and durable.



Long Disk, 4 x 12 inches, and strap to go around the body, \$3.50.

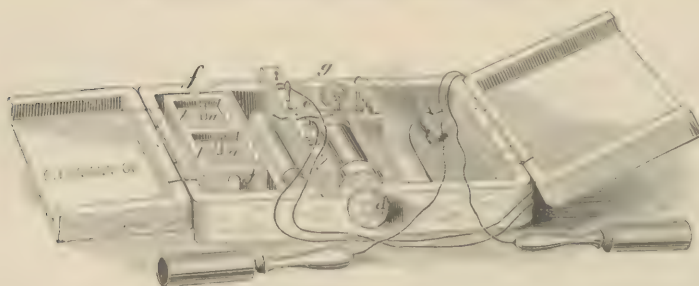
Extra Long Disk, 4 x 8 inches, and strap with buckle for larger body, \$5.00.



A constant medico-electric relief for local pains and weakness, for old rheumatic and neuralgic pains, coldness and stiffness, weak lungs, heart, stomach, kidneys, sluggish liver, lame back and other ailments.

ELECTRO-THERAPEUTIC.

FIG. 1155.—Gaiffe's Battery (Farradic Current).



Accessories to the battery: 1 Pair of sponge holders; 1 Olive-shaped excitor; 1 Spherical excitor; 1 Metallic brush. It gives: The primary current; The secondary current; The current of the two first, combined in intensity; and, Shocks, slow or fast, according to the use either of the contact breaker or the lever.

Admitting that the three currents produce the same physiological effects, they give a series of results increasing in intensity.

The battery working this instrument consists of a small rectangular cell of hard rubber divided in the middle, each part containing a carbon plate and also one of zinc. Each is charged with bi-sulphate of mercury and water, producing no fumes or smell whatever.

To prepare the apparatus for use: remove the zincs, *a a*, from the gutta serena reservoir, *b b*, place a few grains of bi-sulphate of mercury on the carbon plates contained in same reservoir, and mix with a little water. Replace the zincs, *a a*. Should the apparatus refuse to work, give the vibrator, *c*, an impulse with your finger.

The power of the apparatus is regulated by pulling out the tube, *d*, more or less, and increased by adding to the dose of bi-sulphate of mercury.

By placing the conducting wires in their sockets, *A B*, we have the *primary*, in *A C* the *extra*, and in *A D* the *primary and secondary currents*.

To produce *shocks* press on the button, *e*.

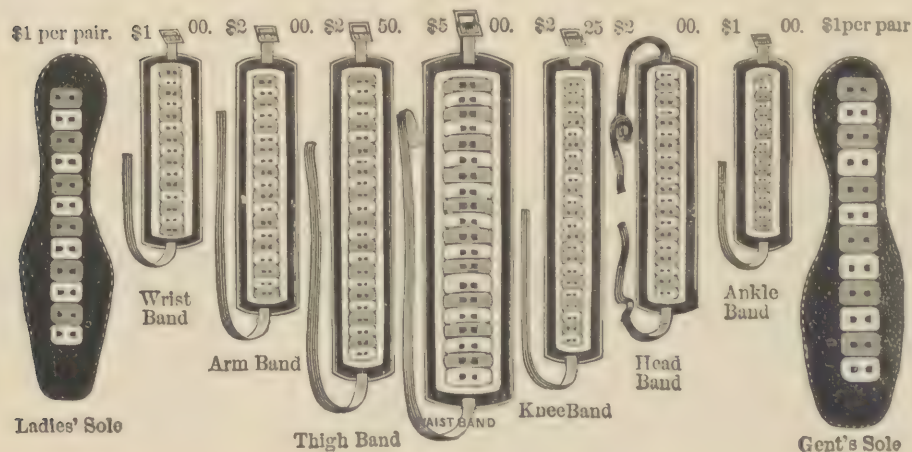
After use, clean out the reservoirs, wash and dry them.

To keep the apparatus in repair:

- a*. Oxide often forms on the platina of the vibrator, *c*, clean it by rubbing it softly with a small smooth file.
- b*. The same may happen to the springs, *f f*, which touch the platinum wires emerging from the reservoir; clean them in like manner, and as they serve the double purpose of holding in place the reservoirs and forming the connection with the instrument, it is necessary to rebend them, should they cease to touch the wires.
- c*. The ends of the conducting wires and their sockets, *A B C D*, should also be kept clean, which may be done with powdered pumice stone and a rag, the holes cleaned out with pumice stone and a piece of wood.

FIG. 1156.—The Voltaic Armadillo.

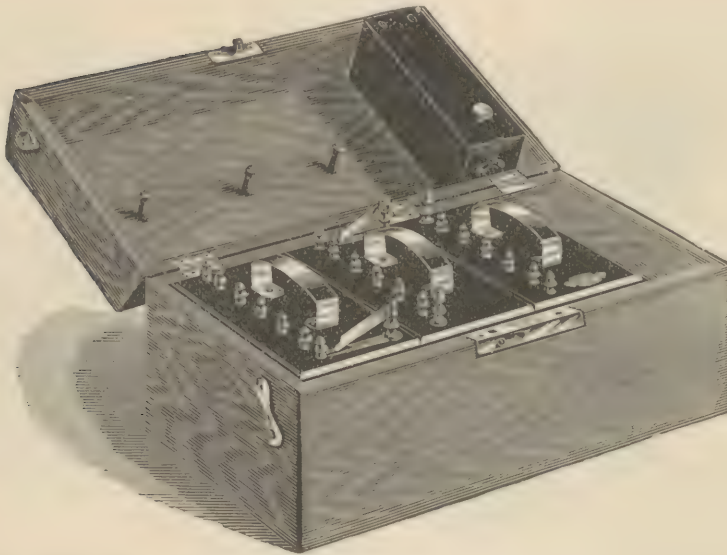
An electro-magnetic remedy for nervous diseases.



ELECTRO-THERAPEUTIC.

FIG. 1157.—Eighteen-cell Galvanic Battery.

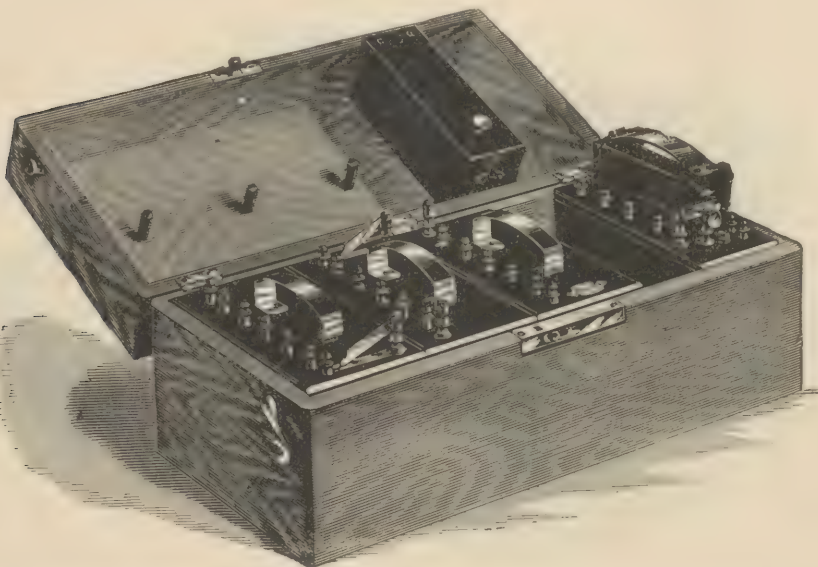
PRICE, \$40.00.



In a polished black walnut case, 12 inches long, 8½ inches wide, 7½ inches high, with lock and handle, metal work all nickel-plated, and first-class sponge electrodes and cable conducting cords. This is a convenient size for physicians' use, as it gives a powerful current and weighs but a little over 14 pounds.

FIG. 1158.—Eighteen-cell Combined Galvanic and Faradic Battery.

PRICE, \$52.50.

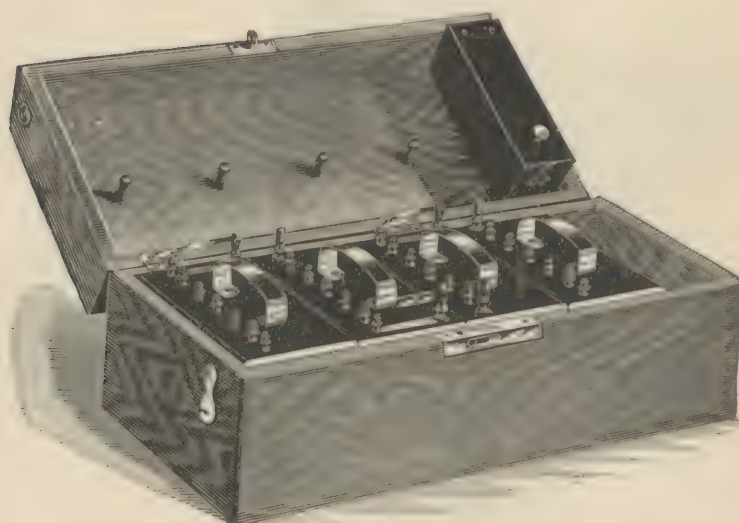


In a polished black walnut case, 17 inches long, 8½ inches wide, 7 inches high, with first-class faradic coil, polished hard-rubber ends and cover, extra large cell to run the coil, sponge electrodes and cable conducting cords. This is the most convenient battery for a physician's use, as it gives a very intense galvanic current and a faradic current of sufficient strength to treat any case. It weighs only 18 pounds, and is perfectly portable.

ELECTRO-THERAPEUTIC.

FIG. 1159.—Twenty-four-cell Galvanic Battery

PRICE, \$55.00.

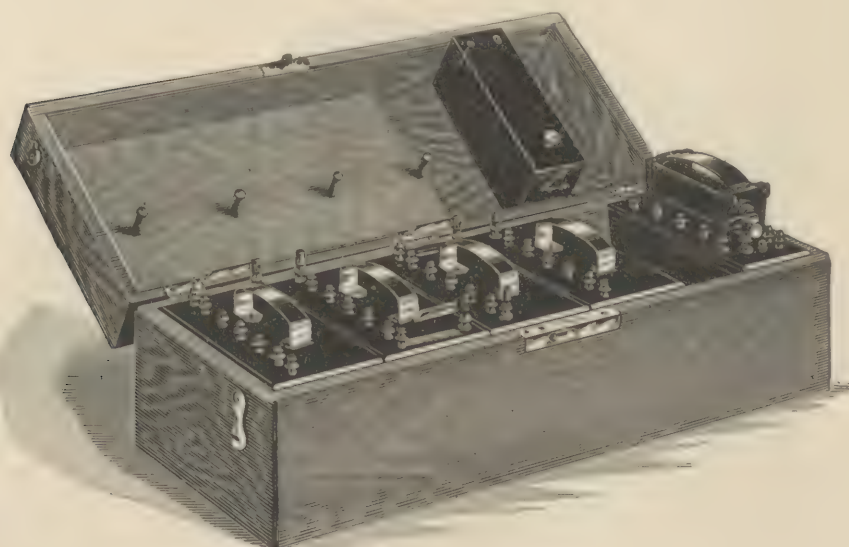


Same style of case, finish, electrodes and cords as the eighteen-cell battery. Case is 15 inches long, 9 inches wide, 3 inches high, with lock and handle. Weighs less than 20 pounds.

This battery gives galvanic current of great intensity, sufficient to treat any case where it is indicated.

FIG. 1160.—Twenty-four-cell Combined Galvanic and Faradic Battery.

PRICE, \$67.50.



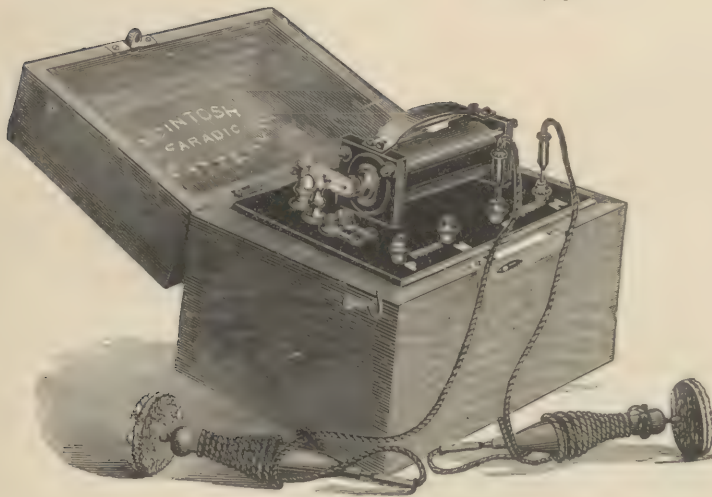
Same style of case and finish as the above (but two inches longer), with first-class faradic coil, polished hard-rubber ends and cover, extra large cell to run the coil, sponge electrodes and cable conducting cords.

This battery gives same intensity of galvanic current as the above, and a faradic current of sufficient strength to treat any case. It weighs only 22 pounds, and is perfectly portable.

ELECTRO-THERAPEUTIC.

FIG. 1161.—McIntosh Physicians' Faradic Battery.

PRICE, \$18.00.



This battery is put up in a neat polished black walnut case, 6 inches in width, 9 inches in length and 7 inches in height, and weighs less than 6 pounds charged. All the metal work is nickel-plated.

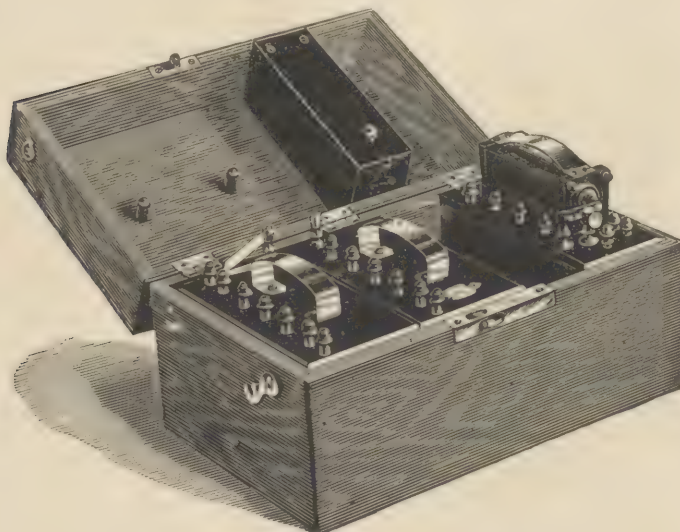
It has a hard-rubber cell and drip-cup. First-class induction coil, with polished hard-rubber ends and cover. The coil, binding posts and rheotome are placed on the upper surface of a polished hard-rubber plate, the under surface of which is covered with soft rubber, and also holds the zinc and carbons. When the elements are removed from the cells and placed in the drip-cup, this plate is securely clamped over them and makes them water-tight. The connections of the coil with the zinc and carbons are permanent.

To use this battery, it is only necessary to loosen the thumb-screws and raise the elements from the drip-cup and place them in the cell, and the battery will commence to work at once; connect one end of the conducting cords with the binding posts, and the others with the sponge electrodes, and it is ready for use.

It is very convenient for a physician's visiting battery, or family use, as it is light and perfectly portable, and gives sufficient strength to treat any case where the faradic or induced current is needed.

FIG. 1162.—Twelve-cell Combined Galvanic and Faradic Battery.

PRICE, \$40.00.

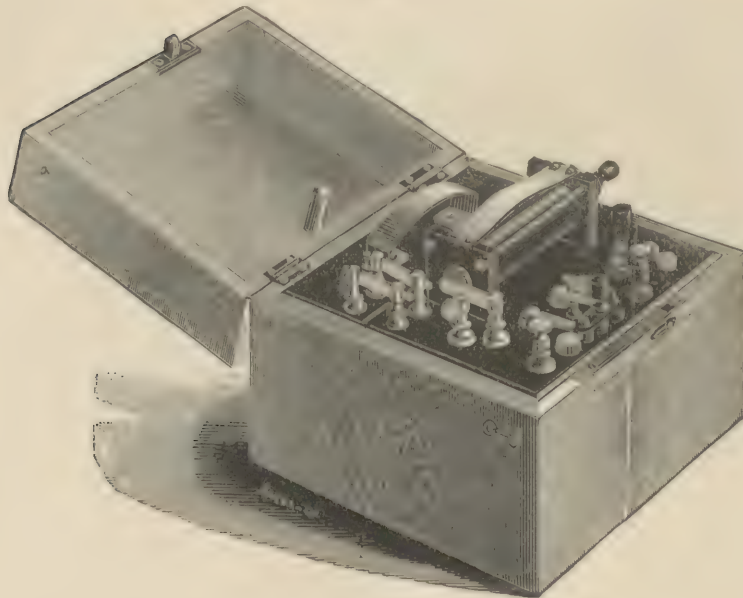


In a polished black walnut case, $13\frac{1}{4}$ inches long, $8\frac{1}{4}$ inches wide, $7\frac{1}{4}$ inches high, with first-class faradic coil, polished hard-rubber ends and cover, extra large cell to run the coil, electrodes and our new cable conducting cords. This battery gives a galvanic current same as above described, and a faradic current of sufficient strength to treat any case.

ELECTRO-THERAPEUTIC.

FIG. 1163.—McIntosh Physicians' Faradic Battery, No. 3.

PRICE, \$30.00.



This instrument is intended for a physician's visiting battery. It is put up in a finely polished black walnut case, 8 inches long, 8 inches wide and $6\frac{1}{2}$ inches high. All the metal work is finely nickel-plated.

It has several new features, which we believe make it the most complete and elegant faradic battery ever offered to the profession. It has a large rubber cell and drip-cup, composed of one piece of hard vulcanized rubber. It has a fine induction coil with polished hard-rubber spool and cover. The coil, rheotome, binding posts, pole changer indicator, and switch to connect primary or secondary current with the binding posts, are attached to a polished hard-rubber plate, 5 x 7 inches. Under this plate is a space for electrodes. The pole changer is so arranged that when moved to the left it uncovers a button marked positive, on which is an index pointing to the positive post on the right. (Post on the left is now negative.) When turned to the right, a button on the left is uncovered and the index points to the positive post on the left. (Post on the right is now negative.) It is not necessary to remove the conducting cords when connected with the binding posts to obtain the *primary* or *secondary* current, as this is accomplished by means of a switch. The elements are securely clamped to a hard-rubber plate, the under side of which is covered with a thick sheet of pure soft rubber. By simply closing the cover of the case, this plate is firmly pressed over the cell and drip-cup, so that it is impossible for the fluid to be spilled. When the battery is to be used, open the box, raise and reverse the plate holding the elements, which immerse in the cell and connect the coil by means of the two bars, which should be pressed into the slots in the two posts opposite them. This makes a very simple, perfect connection.

The handle on the plate holding the elements serves the purpose of a spring, which gives firm and even pressure over the cell and drip-cup when the case is closed.

Another new and very important improvement in this battery is the perfect connections of the elements. The ends of the zinc and carbon plates which are fastened to the rubber plate are covered with hard rubber, which is put on in a soft state, then vulcanized. This covers them so perfectly that no fluid can get between them and the rubber, or the screws which clamp them.

This is the only connection ever made with zinc and carbon elements where the metal work and screws are perfectly protected from the battery fluid.

It is a very convenient and elegantly finished battery, and gives a smooth, even current of great strength. The force can be graduated, from a current so mild as to be scarcely perceptible, to one so strong as to be painful.

With sponge electrodes and cable conducting cord.

ELECTRO-THERAPEUTIC.

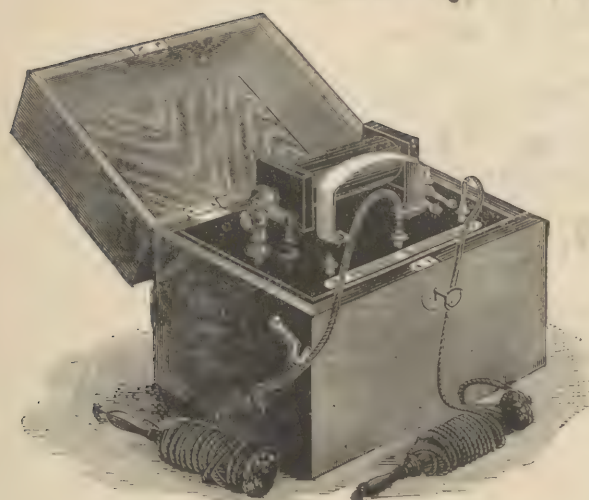


FIG. 1164.—McIntosh Family Faradic Battery.

PRICE, \$10.00.

It is made on the same principle as higher priced faradic batteries, and is portable. It is not intended to take the place of the Physicians' Battery, but is for domestic use. Will give a smooth even current.

It is put up in a neat black walnut case, $6\frac{1}{4}$ inches long, 6 inches high and 5 inches wide, with lock and handle, and furnished with electrodes and conducting cords. All the metal work is finely nickel-plated.

FIG. 1165.—Davis & Kidder's Magneto-Electric Machine.

Price, \$10.



For Nervous Diseases.

Instructions for use, in the English, German, and Spanish languages, accompany each apparatus.

Directions for Operating the McIntosh Faradic Battery.

To make the battery fluid: B—Sulphuric acid (commercial), 3 fluid ounces; powdered bichromate of potass, 2 ounces; water, 16 fluid ounces; bisulphate of mercury, 2 drachms. Dissolve the bisulphate of mercury in the water, then add the bichromate of potass. When dissolved, pour in the sulphuric acid and allow the liquid to cool, as the mingling of the acid and water produces heat, and if the mixture is used when warm it injures the battery.

The bisulphate of mercury keeps the zincs well amalgamated.

To charge the battery: Loosen the thumb-screws that hold the rubber plates over the cell and drip-cup, and fill the large cell one-half full of the battery fluid. When the battery is to be used, immerse the zinc and carbon plates in this cell, and the battery will commence to work at once; if it does not, touch the spring on the coil and set it vibrating. A buzzing sound is produced, which shows that it is in action. The screw-heads on each side of *primary* give the weak current. The screw-heads on each side of *secondary* give the stronger current. Either of the currents can be made stronger by drawing out the tube from the coil.

To use the electric current: Connect the conducting cords with either the primary or secondary current, and hold the sponge electrodes, or place on any part of the body to be treated. The sponges should be thoroughly wet, or the current will not pass. When through using the battery, remove the zinc and carbon plates from the fluid and place in drip-cup, and fasten with the thumb-screws so the soft rubber on the other side of the hard-rubber plate presses evenly over the cell and drip-cup.

In no instance should they be left in the fluid. After using the battery a few times, rinse the zinc and carbon plates; this keeps them clean. After using for some time, the battery fluid should be changed, as it grows weak, and the battery will not act.

ELECTRO-THERAPEUTIC.

ELECTRODES.

Instruments for localized electrization may be used in connection with any galvanic or faradic apparatus.

To affect the tissues beneath the epidermis, electrodes covered with sponge, chamois or flannel moistened with salt-water are most efficient.

Duchenne used the faradic current making applications to muscles. Remak applied the galvanic current to motor nerves.

Niemeyer says: "In the *constant current* we have the means more powerful than any other of modifying the nutritive conditions of parts that are deeply situated."

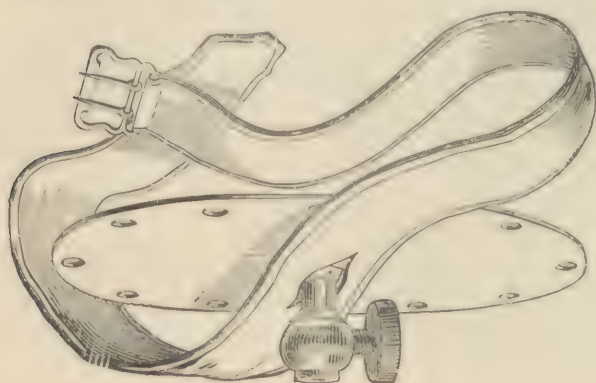
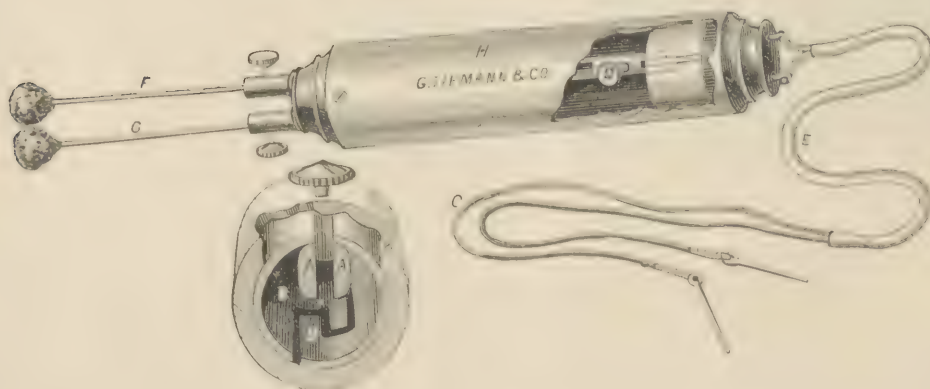


FIG. 1166.—Beard's Adjustable Electrode, with Band.

These are made of different sizes. They can be kept in contact with any part of the body by means of a single cloth band. They may be covered with sponge or with electrode covers made of flannel, provided with elastic in their edges to keep them in position and allow of slipping them on and off easily.

FIG. 1167.—Beard's Current Changer.



It differs mainly in this feature from other devices to accomplish the same purposes, viz.: that the current is reversed by simple and slight pressure of the thumb, without the intervention of a slide or any complex arrangement whatever. The letter *D* represents the button of the spring, by pressing which the current is interrupted or reversed. Pressing it lightly, *interrupts* the current, pressing it firmly *reverses* it. In the vertical section of the hard-rubber handle, *AA* is represented as springing up against a metallic plate on the upper and inner surface of the handle. Pressing it slightly down, the metallic connection is broken and the current is interrupted; pressing it firmly down, the connection is made and reversed at *BB*, the metallic plate on the lower surface of the handle.

C represents the wires that connect with the battery, enclosed in a rubber tubing, *E*.

F and *G* are flexible wire electrodes armed with sponges; they can be separated several inches and kept there, or put close together, as represented in the cut. The advantages of this are these: 1. In many of the applications of localized electrization this neat and simple arrangement saves considerable expenditure of muscle on the part of the operator. One hand can be perfectly free, while the other holds and guides the electrode. In electrizing the muscles of the hand and arm, and of the face especially, it is far more convenient than to use separate electrodes. 2. In cases of paralysis of motion and of sensation, where voltaic alternatives are sometimes indicated, this is the easiest conceivable method of reversing the current.

ELECTRO-THERAPEUTIC.

ELECTRODES IN CASES.



FIG. 1168.—Tiemann & Co.'s Set of Electrodes.

PRICE, IN MOROCCO CASE, \$12.00.

- | | |
|---------------------|-----------------------|
| 1 Sponge Holder. | 1 Rectal and Vaginal. |
| 1 Tongue. | 1 Wire Brush. |
| 1 Needle Holder. | 1 Uterine. |
| 1 Universal Handle. | 1 Vesical Electrode. |

Electrode Case, No. 1.

PRICE, \$30.00.

- | | |
|--|--|
| 1 Wheel Electrode, with universal handle of polished hard rubber, wheel of the same material, set with metallic points, for muscular faradization. | 1 Uterine or Urethral Electrode, insulated with polished hard rubber. |
| 1 Holder for large sponge (nickel-plated). | 1 Spiral Flexible Uterine or Urethral Electrode, insulated. |
| 1 Rectal Electrode, insulated with polished hard rubber. | 1 Laryngeal Electrode, with sponge tip, insulated with polished hard rubber. |
| 1 Vaginal Electrode. | 1 Ear Electrode, insulated with polished hard rubber. |
| 1 Tongue Electrode. | 1 Eye Cup Electrode, new style. |
| 1 Cup-shaped Uterine Electrode. | 1 Hair Brush Electrode. |
| 1 Metallic Brush. | 1 Needle Holder for Electrolysis, with two needles. |

Electrode Case, No. 2.

PRICE, \$15.00.

- | | |
|--|---|
| 1 Universal Sponge Holder, nickel-plated. | 1 Spiral Flexible Uterine or Urethral Electrode, insulated. |
| 1 Rectal Electrode, nickel-plated. | 2 Duchenne's Points, nickel-plated. |
| 1 Vaginal Electrode, nickel-plated. | 1 Ball Electrode, nickel-plated. |
| 1 Nasal Electrode, insulated with polished hard rubber. | 1 Metallic Brush. |
| 1 Cup-shaped Uterine Electrode, insulated with polished hard rubber. | 1 Disk Electrode. |
| | 1 Needle Holder for Electrolysis with one needle. |

TO PRODUCE ELECTROLYSIS OF TUMORS, WARTS, NÆVI, HAIR BULBS, &C.

The manner of introducing a hypodermic syringe is the best method of introducing needles for electrolysis. One or more gold-plated needles (according to size of tumor), connected with the negative pole of the galvanic battery, should be inserted in the base of the tumor, and a sponge electrode connected with the positive pole should be placed on the skin near the tumor. At the commencement of the operation connect from 4 to 6 cells and increase the number until decided electrolysis of the fluids of the tumor take place, which may be known by the escape of a frothy fluid and loosening of the needles—care should be taken that the electrolysis is not carried too far. In tumors the size of a chestnut the passage of a galvanic current from 6 to 10 cells for 5 to 10 minutes is usually sufficient. If more extensive and rapid electrolysis is desired, introduce two or more needles, and connect by means of a needle holder connected with the negative pole of the battery. If electrolysis of the skin is not wanted insulate the needle or needles by coating them with shellac varnish (gum shellac dissolved in alcohol) within 1 to $\frac{1}{4}$ an inch from the point; this will depend on the size of the tumor, as the insulation is to prevent the action of the galvanic current on the skin where the needle passes through it. The pain attendant on the introduction of the needles in large tumors situated in sensitive parts of the body is, of course, best combatted by full anæsthesia, or by ether spray, but in a majority of cases anæsthetics are hardly required.

TO REMOVE HAIR BY ELECTROLYSIS.

Connect the small platinum needle with the negative pole of the galvanic battery and introduce it into the hair sack, using the hair as a guide. The point of the needle should be carried to the bottom of the sack. The positive pole of the battery should be connected with a sponge electrode, which can be placed on the surface of the skin near the hairs to be removed; when electrolysis has been carried far enough the hair bulb can be easily pulled out. Use from 4 to 6 cells of the battery. After the operator has had a little experience he will know the time required and number of cells to use.

ELECTRO-THERAPEUTIC.

FIG. 1169.—Murray's Electrolysis Needle.

(MAGNIFIED VIEW.)

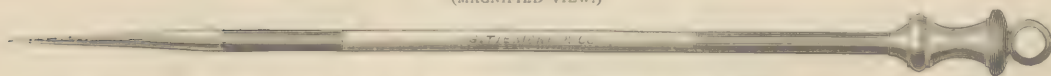


FIG. 1170.—Beard's Long Cutting Needles for Electrolysis of the Base.

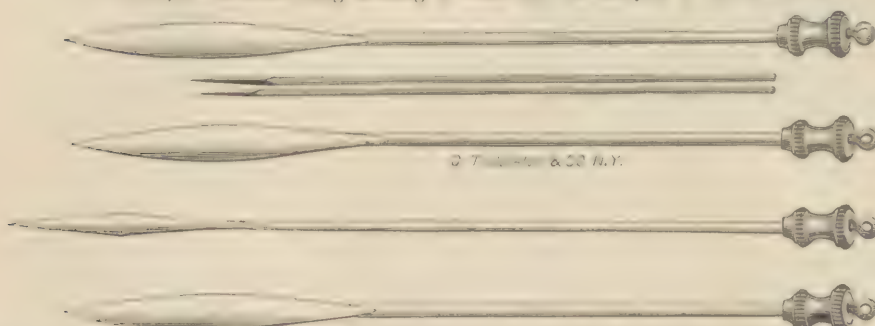
FIG. 1171.
Post's Electro-Massage
Roller.

FIG. 1172.—Butler's Electro-Massage Instrument.

FIG. 1173.—Intra-Uterine
Galvanic Pessary.

Fig. 1174.—Post's Warm Water Electrode.

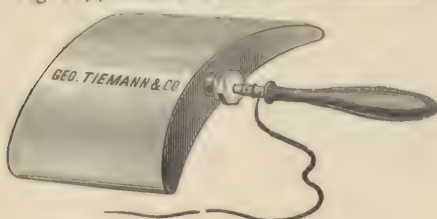


FIG. 1175.—Hank's Galvanic Pessary.

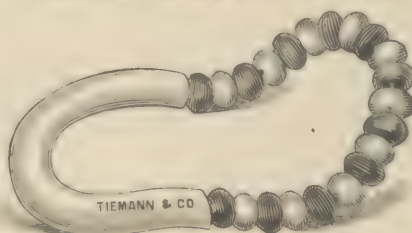


FIG. 1176.—Nunn's Catheter Electrode.

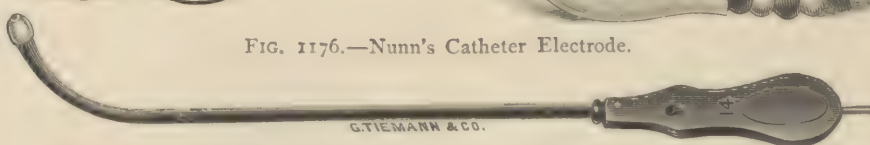


FIG. 1177.—Electro Magnet.



This instrument is for removing bits of iron or steel from the cornea and chambers of the eye. To use the magnet the conducting cords are connected with the poles of a battery cell (a cell with zinc-carbon element is the best), and the small stylet brought near or in contact with the particle, which adheres to the magnet and is removed. If the particle of iron is imbedded in the cornea, it may be necessary to loosen it and then remove it with the magnet, which can be done without contact with the eye. If iron or steel has penetrated either chamber, it is then necessary to introduce the small stylet of the magnet, which attracts the particle, and is easily removed. The connections are made so that it can be joined to the cell of any faradic battery, but its magnetic force is greatly increased by adding several cells.

ELECTRO-THERAPEUTIC.

FIG. 1178.—Wheel Electrode of Hard Rubber, set with metallic points for muscular Faradization; universal hard rubber handle, with current interrupter.

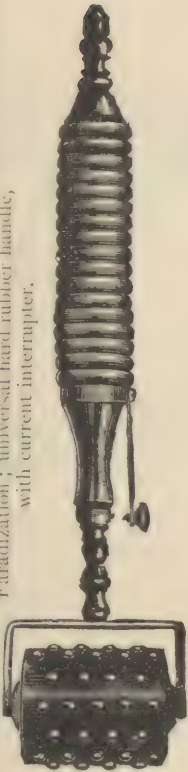


FIG. 1179.—Universal Handles, with Sponge-covered Disk.



FIG. 1180.
Sponge-covered Electrode, Insulated with Soft Rubber for general application with the hand.

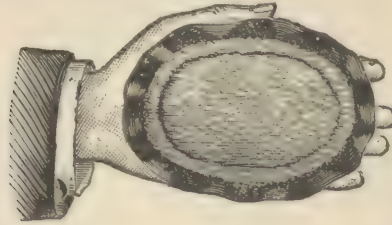


FIG. 1181.—Flannel-covered Foot Plate.

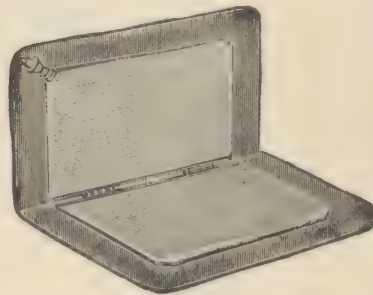
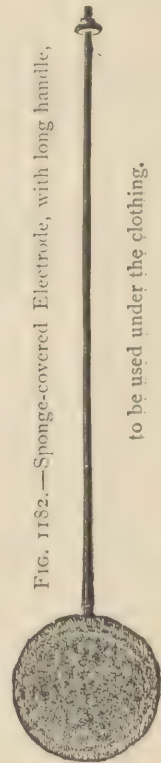


FIG. 1182.—Sponge-covered Electrode, with long handle,



to be used under the clothing.

FIG. 1183.—Ball Rectal Electrode (insulated).



FIG. 1184.—Rectal Electrode, nickel plated.



FIG. 1185.—Rectal Electrode, Insulated with Polished Hard Rubber.



FIG. 1186.—Holder for large sponge Electrodes for universal handle.



FIG. 1187.—Sponge-Cup.

FIG. 1188.—Rectal Electrode, large, nickel plated.



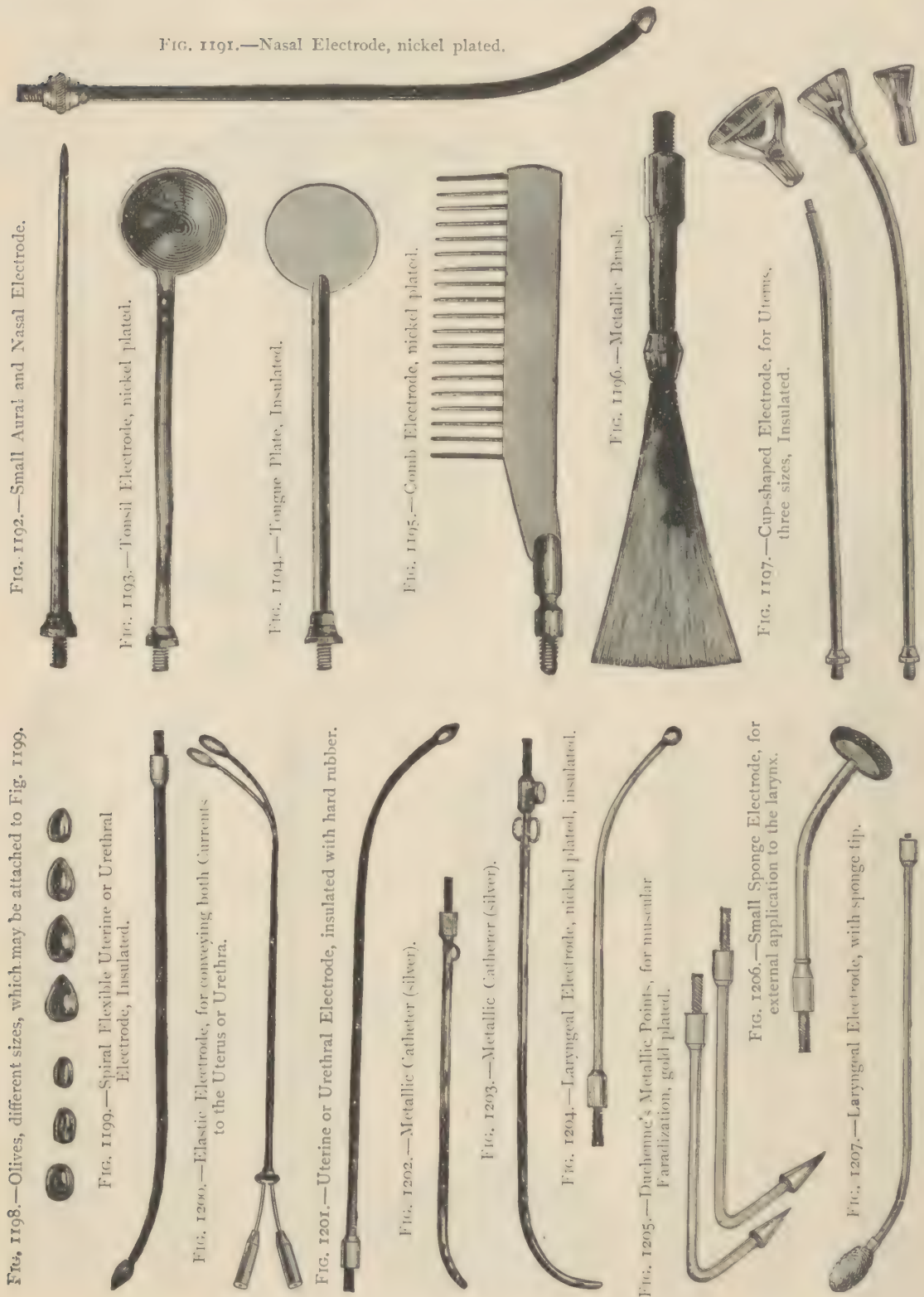
FIG. 1189.—Vaginal Electrode, nickel plated.



FIG. 1190.—Vaginal Electrode, Insulated with Polished Hard Rubber.



ELECTRO-THERAPEUTIC.



ELECTRO-THERAPEUTIC.



ELECTRO-THERAPEUTIC.

FIG. 1225.—Double Ear Electrode, insulated.

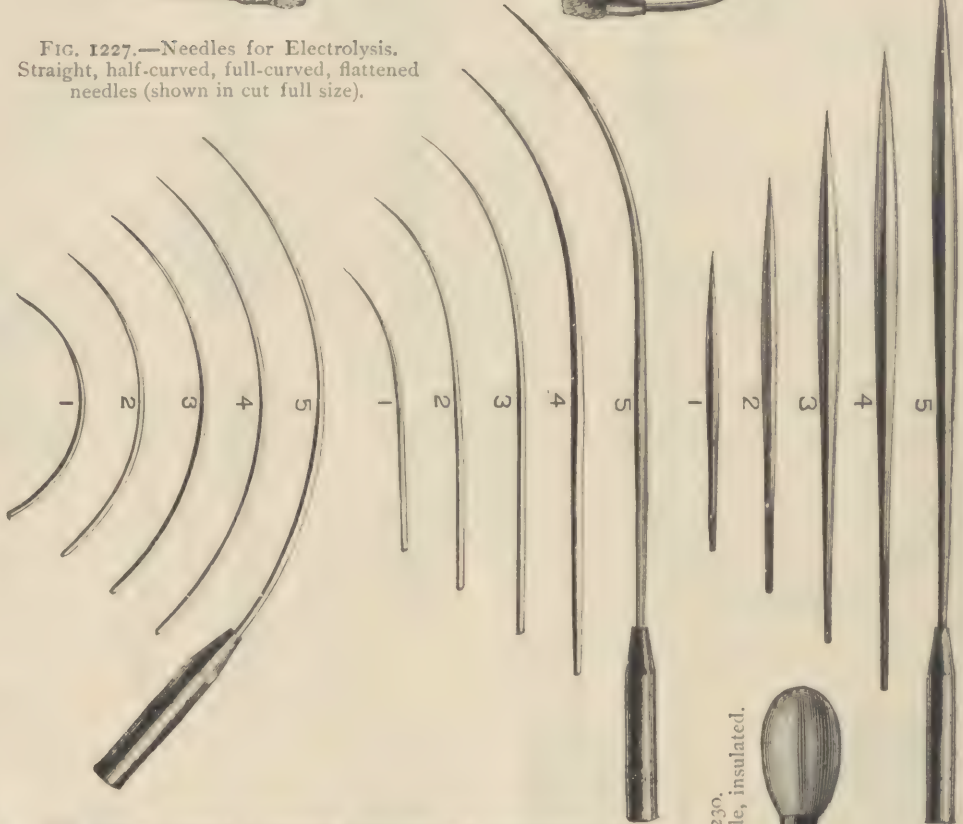
FIG. 1227.—Needles for Electrolysis.
Straight, half-curved, full-curved, flattened
needles (shown in cut full size).

FIG. 1226.—Metallic Sound, nickel plated.



FIG. 1228.—Uterine Electrode, with cup and stem (insulated).

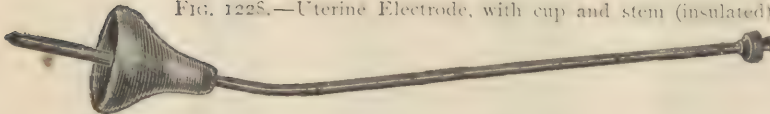
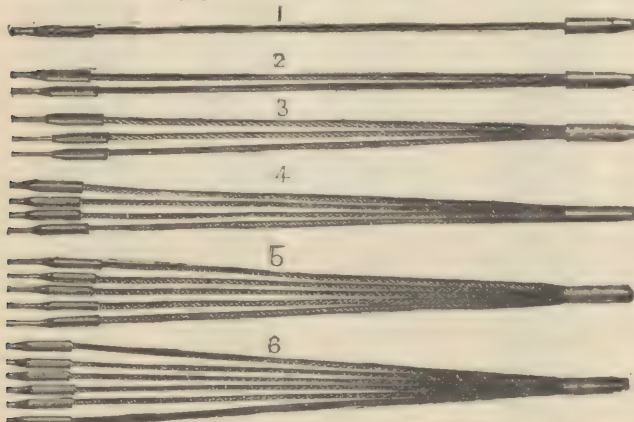
FIG. 1229.—Needle Holders, with cord and tips to hold 1, 2, 3,
4, 5 or 6 needles of any size.FIG. 1230.
Rectal Electrode, insulated.

FIG. 1231.—Metallic Foot Plate.

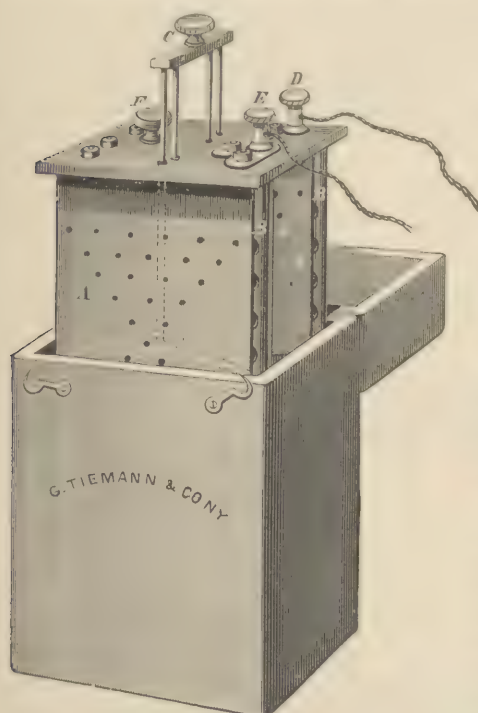


ELECTRO-SURGERY.

GALVANO-CAUTERY.

Galvano-Cautery is employed for removing cancerous, vascular and other tumors, for cauterizing hemorrhoids, fistulous openings and ulcers, for performing tracheotomy, amputations of the tongue and neck of the uterus, and for destroying neuralgic nerves, &c., and has the following advantages over other modes of operating: absence of the hemorrhage usual with cutting instruments, the cauterizing effects can be localized to parts that are not easily accessible to other instruments, and freedom from pain after the operation. The instruments employed are based on the principle of heating a resisting wire by the galvanic current. Platinum is the material best adapted to construct the

FIG. 1232.—Dawson's Galvano-Cautic Battery.



electrodes, as it offers a greater resistance to the passage of the electric current than other metals, and cannot easily be burnt.

For Galvano-Cautery electrical intensity and quantity is required, to accomplish which the batteries made heretofore were bulky, inconvenient and expensive.

The adjoining woodcut represents a galvanic battery, made on a principle devised by Dr. B. F. Dawson, of New York city. It is entirely novel in construction, more perfectly reliable, durable and powerful than any other battery of similar size and cost, and for simplicity of construction, facility in working, and for continuance, uniformity and intensity of its power, has no superior. These advantages over other batteries lie in the principle of construction, and the means for preventing and overcoming what is known as "polarization" of the battery, the occurrence of which in all small batteries has heretofore rendered them unreliable and useless. The battery is composed of but two cells, in each of which are two positive (zincs) and one negative (platinum) plate, all measuring but $4\frac{1}{2}$ by 6 inches. The zincs, *A*, are perforated, and adjusted but half an inch apart, and between them a platinum plate is placed and held in position by uprights, *B*. On each side of the platinum plates are hard rubber or celluloid pumps or agitators (*C*), worked by means of a small knob. *D* and *E* are the connecting screws, and *F* a knob for lifting the battery out of the cells. The entire battery requires but $2\frac{1}{2}$ pints of fluid, with which amount it will keep up a most powerful action, long enough for the most prolonged operation, by the moving up and down of the pumps, *C*, which, according to the intensity of the heat desired are moved more or less quickly. By this action, the old and exhausted fluid between the plates is thrown out through the perforations, and fresh fluid is made to take its place; thus keep-

ing up a uniform power, equal in intensity and constancy to that obtained from the large imported batteries. In consequence of its power it has been found necessary to make special platinum cautery instruments of heavier metal to accompany this battery. Batteries have already been ordered by many of the most eminent surgeons and physicians, in place of others of foreign and domestic manufacture, which latter they pronounce inferior to this in portability, simplicity, reliability, power and compactness. *The entire battery, with polished wood case, measures $8\frac{1}{2}$ inches in height, 6 inches in width and 4 inches in depth from front to back.* Each battery will be fully guaranteed to prove all that is claimed for it. Directions, &c., accompany each. In ordering platinum cautery knives and wire, it will be best to state for what class of operations it is designated to use them, for thus satisfaction will be more perfectly secured. *The principle upon which this battery is constructed being applicable to all galvanic batteries, for whatever use, was patented Sept. 7th, 1875, No. 167,510.*

FIG. 1233.—Galvano-Cautery Sling and Platina Wire.



The loop is formed of flexible platinum wire, and may be of any size. By turning the wheel on the handle, the loop is contracted, and, being heated by the battery, cuts the tumor off gradually. The instrument is applied cold; it becomes heated instantly at the moment the circuit is completed, which is done by attaching the wires in the socket at the extremity of the handle.

ELECTRO-SURGERY.

FIG. 1234.—Dawson's Universal Cautery Electrode.



The woodcut represents a universal electrode for galvanic-cautery operations. Of the simplest mechanism, it also combines strength, lightness, durability and perfect reliability, either as a galvanic-cautery *écraseur*, or cautery knife, needle or applicator.

A is a solid hard rubber handle, through which pass the conducting rods, C C, connected with the conducting wires at B. The rods, C C, being hollow half their length, admit of the rods running from the ivory tip, E, to slide in and out like a telescope, which they are made to do by turning the small wheel, F. This telescoping of the rods keeps up perfect current connection, and at the same time causes a slow contraction of the wire cautery loop at E, the ends of the wire being secured in the ivory clamps, G, on the rods, C C. The current is regulated or cut off and on from the battery by the screw, D.

The small illustrations show three of the cautery instruments accompanying the handle, and which are used by withdrawing the tip, E, with its rods and adjusting the individual cautery instruments that may be requisite into the open ends of the rods, C C.

FIG. 1235.—Schroetter's Laryngeal Cautery Electrodes.

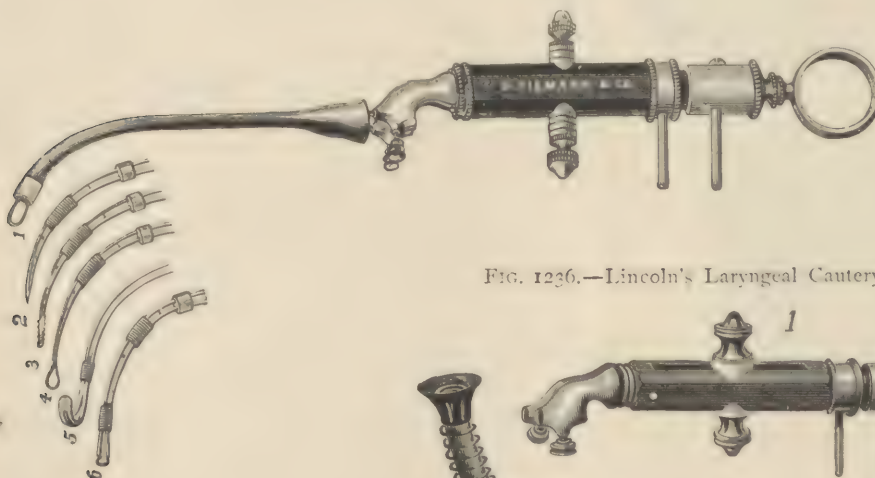
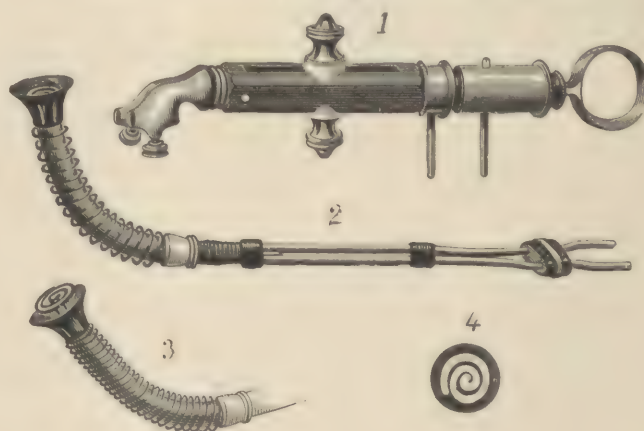


FIG. 1236.—Lincoln's Laryngeal Cautery Electrode.



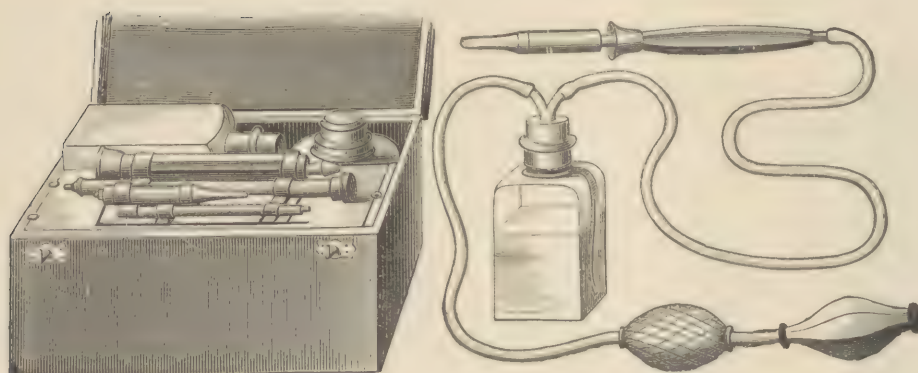
1. Snare of platinum.
2. Lancet.
3. Porcelain burner.
4. Knife.
5. Voltolini's knife.
6. Blunt's cautery.

It consists of an electrode fitted to Schroetter's handle. In some cases the shield may be dispensed with, either on account of the patient being able to avoid contraction of the palate during the operation, or when it can be controlled by some retractor.

1. Schroetter's universal handle; 2. Electrode, on which is fixed a spiral spring terminating in a shield of bone, concealing a platina disk, which terminates the electrode; 3. The same, with the disk disclosed by the recession of the shield when pressed against the tissue in the act of cauterization. The shield serves to protect the surrounding parts in case the instrument is grasped by them during an operation; 4. The disk in its relation with the shield.

THERMO-CAUTERY.

FIG. 1237.—Paquelin's Thermo-Cautery.



The apparatus consists of a hollow handle, insulated with wood, to protect the hands from the heat. It is furnished with two movable hollow platinum cauteries; into these, after they have been heated to blackness in a flame of a spirit lamp, a blast of benzine vapor is introduced by means of a Richardson's spray bellows, which at once rises to and maintains them at a state of vivid incandescence. The heat thus produced can be kept up for an indefinite time by slightly compressing the bellows occasionally.

The apparatus, in a morocco case, direct from the manufacturer.

ACTUAL CAUTERY.

FIG. 1238.—Nævus Needle.



FIG. 1239.—Wight's Blowpipe.

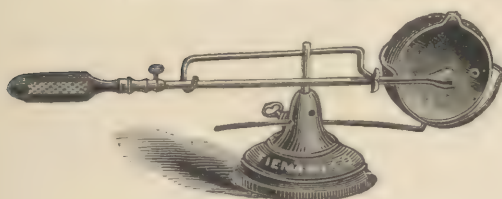


FIG. 1240.—Blowpipe for Heating Irons.



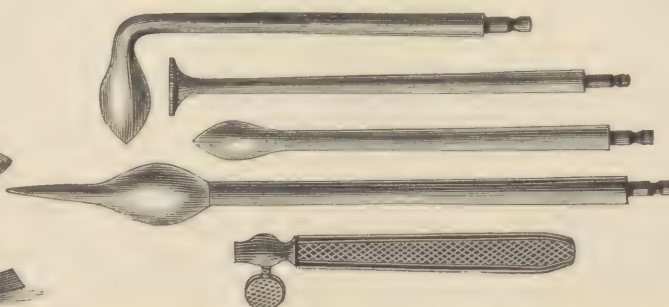
FIG. 1241.—Cautery Irons.



FIG. 1242.—Cautery Irons.

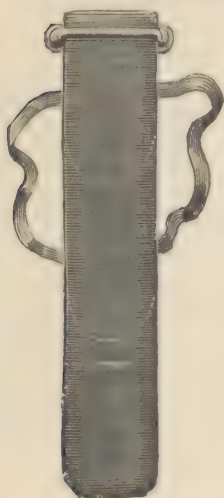


FIG. 1243.—Cautery Irons.



DRY COLD AND HEAT.

FIG. 1244.
Spinal Ice Bag,
for the application of dry
heat and dry cold.



DIRECTIONS FOR PREPARING AND APPLYING.

Put ice (broken into pieces about the size of a nut) into the opening of the bag, on the side nearest to the loops, until the contents of the lowest cell reach up to the bottom of the second cell; then into the middle opening until it reaches up to the bottom of the third cell; and, finally, fill the top cell. Then close the bag with the clamp, *placing it on the thickened, band-like part around the mouth*, and letting the screws be on the same side as the loops of the bag. When the clamp is properly applied, a very moderate pressure by its screws is needful to make the bag water-tight. Care must be taken that each cell is not so filled as to cause it to become round, otherwise only a small portion of the bag will touch the back. It is also expedient that the contents of the several cells should only slightly overlap each other.

In applying the bag, place the smooth side of it in apposition with the back, the side bearing the loops being turned outwards. The bag may be kept in its position in various ways. If it is intended to be used for only a short time, or if the patient be in bed, the best plan is to lie upon it, taking care that it is exactly along the centre of the back. If the patient should wish to move about, pass the elastic band around the head, in order that it may hold the upper cell close to the back of the neck, and sustain the bag by fastening the clothes tightly outside of it; or pass a long tape through the lower loop, carrying each half of this tape over the shoulders, crossing one over the other in front of the chest, carrying them backwards around the waist, in order to clasp the bag closely into the small of the back, and then, bringing them forward, tie them in front.

As ice contains a considerable amount of air, this air, as the ice melts, accumulates at the top of the bag, and being a bad conductor of heat, prevents the still unmelted ice which it surrounds from exerting its intended influence: it is therefore necessary to unscrew the clamp occasionally, in order to let the air escape, and, if the bag is to be worn for a considerable time, to replace the air by a little fresh ice.

FIG. 1245.—Dr. Allan McLane Hamilton's Revulsor.



For patients with dysæsthesiæ, spinal irritation, and a few other maladies, confined chiefly to women, and dependent upon uterine diseases, I found the alternate use of heat and cold to be followed by the most desirable effects, particularly in spinal irritation. Of twenty-six cases of this kind I have cured fifteen, and have greatly improved all the others. I at first directed the patients to employ icebags, and hot flat-irons covered by flannel, but subsequently made use of the instrument I will presently describe. In hysterical affections this mode of treatment was of great use, particularly those forms characterized by lividity of the surface and unconsciousness, with rigidity. The surface became warmer and the circulation much more equable after ten or fifteen minutes' use of the revulsor.

It consists of two chambers of brass, two and a half inches in diameter by one and a half inches deep. These have screw plugs inserted so that they may be removed and the chambers filled, one with cold water and salt, the other with hot water. These chambers are fixed on a rod, and separated by an insulating or non-conducting substance. The rod terminates in a handle. The flat surface covered by thin flannel is placed against the bare back, on either side of the spinous processes of the vertebrae, and the instrument is passed up and down quite rapidly. As the heated surface moves instantaneously to where the cold one was an instant before, the effect is quite marked.

Dry heat and dry cold are much better as therapeutical agents than moist heat or moist cold. The effect is energetic; the skin is influenced more quickly, as there is no fluid between to act as a non-conductor.

In paralytic conditions, local applications of the revulsor to the muscles themselves seemed to increase the circulation in the tissues much more vigorously and successfully than did the faradic current.

Heat and cold, I am convinced, are valuable remedies that have not been thoroughly made use of

Dr. Winternitz, of Vienna, uses a new instrument for treating pollutions, spermatorrhœa and chronic gonorrhœa, which he names Psychrophor. It is a double current catheter without eyes, the two canals communicating near the point of the instrument. It is introduced into the urethra until its point has passed the pars prostatica, and it is then attached by rubber tubing to a reservoir containing water of the desired temperature. On turning the stopcock, the

DRY COLD AND HEAT.

water flows into one canal and out through the other. In this way the caput callinaginis and the entire mucous membrane are exposed to the mechanical action of pressure and the *sedative action of cold*.

Other instruments for the application of dry heat or cold have been devised, as: for the penis and scrotum, by Dr. Otis; for the head, neck, breast, abdomen, anus, &c., by Leiter.

They may be readily made of lead or rubber pipe—preferably lead, on account of being a superior conductor of heat or cold. The lead pipe is molded in coils to the part of the body to be treated: one of its ends is connected by rubber tubing to any form of reservoir containing water of the desired temperature which, circulating through the coils, finds its exit at the other end into some convenient receptacle.

HOT WATER.

USE OF WARM AND HOT WATER IN SURGERY.

By Professor FRANK HASTINGS HAMILTON, M. D., of New York City.

(Extracted from the *New York Medical Record*, May 15th, 1874.)

No treatment hitherto adopted, under our observation, has been attended with equally favorable results.

Under this plan the area of acute inflammation is exceedingly limited; erysipelatous inflammation has been almost uniformly arrested or restrained when it has actually commenced, and it has never originated after submersion; gangrene has in no instance extended beyond the parts originally injured, and when progressing it has in most cases been speedily arrested (in gangrene hot water, or water at a temperature of from 100° to 110° Fahrenheit, is to be preferred). Septicæmia and pyæmia have not ensued in any case in which submersion has been practised from the first day of the accident. Purulent infiltration and consecutive abscesses have been infrequent, and always limited to the neighborhood of the parts injured, and of small extent. Traumatic fever, usually present after grave accidents, when other plans of treatment have been pursued, as early as the third or fourth day, has seldom been present when this plan has been adopted, and in no case has the fever been intense or alarming.

The phenomena usually observed in cases of recent lacerated or incised wounds, when submerged, are, a sense of comfort, yet not absolute relief from pain; on the second or third day the parts adjacent are swollen, but not much reddened; the integument generally assumes a white and sodden appearance, and with only slight tenderness. On the fifth, sixth or seventh day the swelling is greater than usually accompanies other plans of treatment; and, with the inexperienced, is likely to excite alarm, but is found not to be attended with increased tenderness, and it pits under pressure, showing that it is a condition of œdema chiefly. At this time the granulations are generally covered with lymph, or some exudate of a whitish color, and which might easily be mistaken for a diphtheritic deposit. At the end of fourteen days, or thereabouts (the period at which, in most cases, we substitute fomentation for submersion), the limb is still œdematous, the granulations are abundant, sometimes presenting a fresh red appearance, and at others covered with the white exudate.

TO WHAT CLASS OF CASES SUBMERSION IS ESPECIALLY APPLICABLE.

Position of injury.—The lower extremities can only be completely and permanently submerged to a point three or four inches below the knee, and the upper extremities to a point a few inches above the elbow: consequently, submersion is limited to those portions of the extremities which are below the points mentioned.

Character of injury.—Submersion in warm water demonstrates its superiority over other plans, especially in the case of a laceration or contusion of the hand or of the foot, when the integument and flesh are extensively torn—provided the limb is submerged without closing the wound—that is, without sutures or bandages; indeed, sutures are inadmissible when this plan is adopted, since the œdema which almost inevitably ensues would break away the sutures,

Mere contusions, without external lesions, have been treated almost constantly at St. Francis' by this method; and the results have been in all cases satisfactory, and occasionally they have progressed toward recovery in a manner to excite surprise.

Simple incised wounds have seldom been subjected to immersion, since it inevitably defeats union by first intention. Nor have wounds caused by *amputation* been treated in this manner, partly for the reason just given, and partly because of certain apprehensions that the depending position might expose the patient to the dangers of a secondary hemorrhage where large arteries have been severed and are exposed in the wound.

HOT WATER.

VALUE OF HOT WATER IN TRAUMATIC GANGRENE.

The power of hot-water baths, or water at or above the normal temperature of the blood, to arrest traumatic gangrene is remarkable; and the writer entertains a hope that its efficiency may not be limited to *traumatic* gangrene alone, yet this remains to be proved.

METHOD OF USING THE WARM-WATER BATH.

For the arm and hand we have an oblong zinc bath, 23 inches long by 8 inches wide and 8 in depth, with somewhat flaring margins where the arm is to enter, supplied with a movable cover, which leaves an opening for the arm, and provided with a stop-cock to enable us to draw off and renew the water. Along the upper and outer margin of the bath are arranged small wire-pins, upon which pieces of cloth may be fastened for the purpose of suspending the limb. Care must be taken not to allow the limb to rest against the edge of the bath, so as to interfere with the circulation, and it must be carefully adjusted upon a shelf, beside the bed, in such a position as will be most comfortable to the patient.

FIG. 1246.—Bath for Arm, Forearm and Hand.



For the lower extremity a zinc bath is used also, somewhat larger, the floor being in the form of an inverted roof, the apex of which is below; the base being represented by the open top of the bath; this latter is provided also with a movable cover. The apex is supported by a wooden frame and horizontal board. This bath is, like the arm-bath, provided with pins for suspension of the limb, and a stop-cock.

In the case of the foot-bath, when it is found uncomfortable to project the foot from the side of the bed, the portion of the bed upon which the body reposes is elevated by mattresses, and the bath is placed on the floor of the bedstead.

We have not thought it necessary to keep the water at an absolute uniform temperature, so that its management is left very much to the judgment of the patient or his attendant; but usually it has been kept at such a temperature as to feel warm to the hand of the attendant—and this is found to be about 95° Fahrenheit. Sufficient uniformity has been attained generally by changing the water three times daily.

In case of a recent wound, where secondary hemorrhage is at all liable to occur, the limb is dressed for a few hours with either warm or cold fomentations, and is left reposing in bed; but neither sutures, adhesive plasters, nor bandages are applied. At the expiration of this time either the bath or the warm-water fomentations are commenced, and there-

FIG. 1247.—Bath for the Lower Extremity.



after employed systematically. The patient is at liberty at any time to lift the limb from the bath, and he generally does this pretty often, to see how it is progressing.

Warm-water fomentations are regarded by us as always second in value to submersion in the preventing and cure of inflammation, and they are reserved, therefore, for those examples in which submersion for one or another reason cannot properly be employed.

Fomentations are employed by us after the fourteenth day in all those cases in which we employ submersion at first—occasionally, when the patient is weary of the confinement of the bath, the limb is taken out and fomented during the night.

We employ fomentations in amputations and other incised wounds when union by first intent is desired; in lacerated and contused wounds which cannot be

subjected to immersion; in most examples of ulcers; in many syphilitic and cancerous sores; in some simple contusions and sprains. In short, to repeat what has been already intimated, with warm water, either in the form of the bath or fomentation, we treat nearly all surgical accidents. Carbolic acid, the chlorinate of soda or lime, and other antiseptics being reserved for very rare and exceptional cases.

In using the fomentations we envelop the wound and limb in several folds of sheet lint or soft old muslin, saturated with warm water, the whole being enclosed in oiled silk or vulcanized rubber. This is changed about once in four or six hours.

ANÆSTHETIC.

FIG. 1248.—Lente's Modified Ether Inhaler.

A person thoroughly conversant with the use of ether can succeed quite well, though with a waste of the drug and greater annoyance to the operator and assistants, with an extemporized apparatus, a towel and stiff paper formed into a cone, or a cup sponge enveloped in some impervious material. The great objection, however, to a soft apparatus is that its air space is liable to be, and almost invariably is, much contracted during the struggles of the patient by the



pressure exerted upon it either by the administrator or the patient who frequently clutches it and gets it out of shape, and by losing its stiffness from other causes, so that, as the writer has not unfrequently seen, the patient's struggles are mainly caused by having but little chance to breathe either air or ether. The writer formerly contended that, in using the inhaler, the admixture of air should be prevented *as far as possible*. This was owing to the imperfect fitting of the different parts of the instrument, and of the cushion to the face, more air than necessary being thus admitted. With the present apparatus, however, its improved shape and better fitting cushion, all entrance of air may be prevented, which was never considered desirable. An arrangement is, therefore, made for the admission of more or less air at the apex of the cone. But at the same time, the writer adheres to his original idea that *but little air* should be admitted after the patient *is able to breathe with tolerable facility*—that is, if we desire *rapid* etherization, which is not desirable if the operation is to be a protracted one.

The present instrument resembles very much the face-piece of Waldenburg's apparatus for condensing and rarifying air; and the idea of using sheet brass and the india-rubber air-cushion was indeed taken from it. But the air-cushion is a failure, as almost all *inflated* things are, without an improvement suggested by the writer, the stuffing of the tube first with hair, so that, when the air leaks out, the cushion will still retain sufficient of its rotundity to fit the face air-tight. When it is to be used, a handkerchief, or piece of sheet lint, &c., is stuffed into the cone, a wire or whalebone arrangement slipped in to keep it off the face, and it is ready. There is a *hole* in the stopper to admit air, and if more air is needed the stopper can be removed. The ether can be poured in the opening at the apex, in case it is undesirable to remove the cone from the face, or throw it on the cloth. Its cleanliness is perfect, as a different piece of cloth may be used each time.

FIG. 1249.—Allis' Ether Inhaler.

The apparatus consists of a wire frame-work, sufficiently large to cover the lower part of the face. The wires are parallel, and about an eighth of an inch apart. Between the wires, from side to side, a strip of bandage two and one half inches wide is passed. The instrument is only about four inches long and three inches at its greatest width, and yet it consumes more than three yards of bandage when passed between all the wires. By further reference to the figure it will be seen that each section of the bandage is separate from the adjoining one, thus permitting the air to pass freely to both sides of it.



Its advantages are these: The ether being very thoroughly mixed with air, the patient does not suffer from the suffocation usually felt at first inhaling; there is a large evaporating surface. A very much smaller quantity of ether is used, and less escapes into the room than with the usual mode of giving this anæsthetic; the ether can be dropped from a bottle on the distal end of the inhaler, without removing it from the face; the mask is soft and pliable, fitting accurately to the nose and mouth; and, lastly, it is of very simple construction, and cannot get out of order.

Over this frame is drawn a piece of stout sheet india-rubber, or patent leather, which has been stitched together at the edges, so as to make a covering for the frame, projecting over one end two inches, to form the mask, and at the other one inch. The ether is poured on the bandage, which forms a close, well-made artificial sponge.

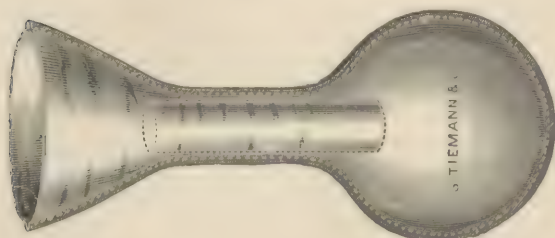
My mode of using it is as follows: Placing it over the face, I sprinkle on a *few drops* of ether—I mean literally but a few drops. In a few seconds I add a few more drops; and usually in from half a minute to a minute I find that I can drop it more constantly. As soon as I notice the *deep inspirations*, I pour on a small stream, watching carefully lest I irritate the larynx; and as soon as I find the patient tolerant of its vapor, I add it in larger quantities, and as rapidly as can be evaporated, and am usually gratified by seeing my patient pass *quietly* under its influence in from three to ten minutes.

The instrument is especially serviceable when a prolonged use of ether is required. A slight *dripping* will suffice to prolong the effect, and economy of ether, though not a great desideratum, is still worthy of consideration.

ANÆSTHETIC.

FIG. 1250.—Squibb's Ether Inhaler.

The apparatus consists of an hour-glass shaped muslin bag, which, when laid flat, is about twenty inches long by nine inches wide at the widest part, one end of which is cut off so as to be funnel-shaped, and open to receive the lower part of the face. This funnel-shaped mouth of the bag is of such a size as to admit the nose, mouth, chin and beard



of an adult male, and may be adapted to any smaller face by turning it back like a cuff. The muslin of this end of the bag is double, to afford additional obstruction here to the passage of air and ether vapor. The narrow part of the bag is made elongated, so as to receive a tin tube about seven inches long and two inches in diameter. And the bottom of the bag or round end is made of such a size that, when moderately distended, it holds say forty or fifty cubic inches, or more than is necessary for a full inspiration.

When about to be used, this bag is thoroughly wetted in water, and squeezed so that it does not drip, for the purpose of rendering it only partially pervious to air and ether vapor. It is not certain that an impervious bag would not answer as well, but it would be more difficult to obtain, more expensive, less cleanly, and, perhaps, less safe. The sole object of the tin tube is to keep the narrow portion of the bag distended while in use. A piece of flannel about six and a half inches wide and eighteen inches long, and a piece of thick blotting paper or blotting card of the same size as the flannel, completes the apparatus. The flannel is laid upon the blotting board, and the two are rolled up together into a roll or spiral which will slip into the tin tube, and when there spring out sufficiently to retain its place loosely. A two-ounce graduated measure, and a can or bottle of ether, are all that are now required for the anæsthesia.

The patient to be anæsthetized — fasting, takes, about fifteen minutes before the time set for the operation, a fluid ounce or a fluid ounce and a half of brandy or whiskey, if an adult male, or two fluid ounces of wine, if a female.

This, upon an empty stomach, will produce slight intoxication in about ten minutes, and the anæsthetic has only to supplement this in order to get quickly through the stage of excitement in many cases. It also renders retching less likely to occur. The patient is then placed quietly on the table, and is advised in a slow, quiet tone, to be composed and perfectly still. He is told that he will soon begin to feel intoxicated, or excited and restless; that this is very much under his control, and that the more he resists the sooner he will be asleep. If this advice be given with tact and skill, it will be well received, and be of service in a majority of cases. The manipulator is then to wet the bag thoroughly, squeeze out the water until it no longer drips, slip the empty tin tube into its place in the narrow part of the wet bag, and then prepare the charge of ether. This may be done in several ways; but perhaps the best way is to pour the measured quantity of ether into a tumbler, and having allowed the roll of flannel and blotting board to expand itself to nearly the size for the tin tube, dip first one end and

then the other into the ether until the ether is all taken up, and then at once slip the charged roll into its place in the tin tube, the latter being already in its place in the wet bag. Then fold, first one end of the wet bag and then the other, up over the part which holds the tin tube, so that both ends of the tin tube may be closed up by the wet muslin to prevent loss of ether, and then lay it aside, ready for use at any moment. The loss of ether, while thus laying ready, is very small, not over a fluid drachm in half an hour. The quantity of ether for the first charge should vary with the estimated sensibility of the patient. For an adult man one and a half to two fluid ounces, and for females and sensitive males one to one and a half fluid ounce is sufficient, if the ether be good; for children, a half to one fluid ounce. In the anæsthesia of children, and in many exceptional cases, no general rule can be laid down; and, indeed, the circumstances of each case must always modify each application.



FIG. 1251.—Chisolm's Pocket Ether Inhaler.

Chisolm's Pocket Ether Inhaler is in the shape of a lancet case, made of german silver or nickel-plated brass. It is stuffed with washed sheep's wool or sponge. The wire gauze or perforated circle is for the reception of the ether and for the admission of air. On the cover are two nozzles for introduction into the nostrils. When the instrument is not in use this cover is reversed, and it may then be carried in the pocket like the common lancet case.

ANÆSTHETIC.

FIG. 1252.—Cheatham's Ether Inhaler.

It operates by Lente's method of replenishing the evaporating surface without removing it from the face.

A patient cannot be anæsthetized as quickly with it as with a common cone, but with much less ether. It economizes by not having to remove it from the face to replenish it, and by this you avoid the disagreeable effect of having the ether that would otherwise escape permeating every part of the house in which it is used. Its convenience of application is also quite obvious. The ease with which the face-piece (being paper) can be removed immediately after use and thrown away is, I think, a strong recommendation in its favor.

This apparatus consists of a tin cup (*A*), holding in the inside a sponge as an evaporating surface, and connected from the top by rubber tubing with the bottle that contains the anæsthetic. This tube has attached to its distal end a cap (*D*) that will fit over the neck of almost any bottle.

Make a cone of paper, cut the top off, so that when tin cup (*A*) is slipped inside, the top of the cup will protrude a line or two from the top of cone.

Place tin cup (*B*) over both cup and cone, screw it down tightly by means of nut (*C*), and you have the cone held tightly. Attach tube to top of cup, and the apparatus is complete. The smaller the cone the quicker you can get the patient under the influence of the anæsthetic. I would suggest, after the cone is in position, the bottom should be trimmed, leaving a part of it—we shall call it the back part—that is intended to go over the chin, three inches longer than the cup, and sloping forwards and upwards, leaving the front part, intended to go over the nose, about an inch longer than the cup. *E* gives an inside view of cup (*A*).

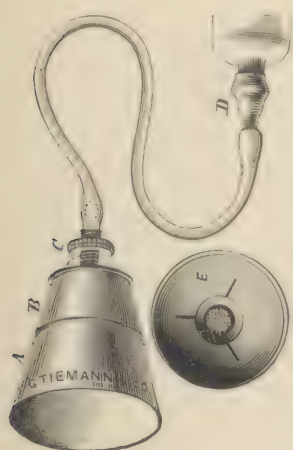
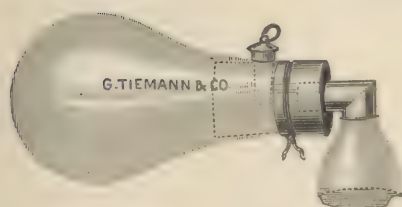


FIG. 1253.—Hutchison's Ether Inhaler.



Dr. J. C. Hutchison recently presented to the Medical Society of the County of Kings (*Proceedings of the Society*) an ether inhaler, which he describes as follows:

A tin tube for holding a sponge for the ether, three and a quarter inches long and two and a quarter inches in diameter; one end is left open, to be covered by a muslin bag, the other is closed, with the exception of an opening at its upper part, one inch in diameter, into which is inverted a tube for attaching a rubber hood. This tube projects

backward three-fourths of an inch, and is then carried downward, at a right angle, to a level with the lower margin of the sponge tube. This arrangement prevents the liquid ether from running down upon the patient's face or mouth. There is an opening in the centre of the top of the large tube, one inch in diameter, having a neck half an inch long, which is closed by a cork; through this opening the ether is poured upon the sponge without removing the mask from the patient's face. A rubber hood, such as is used in giving nitrous oxide gas, fits accurately over the mouth and nose, and may be so adapted to any face as to completely exclude the air. The neck of a muslin bag, pear-shaped, eleven inches long, and eight or nine inches wide at its widest part, fits closely over the open end of the sponge tube, and has a slit an inch and a half long at its mouth, to the corners of which tapes are attached, for the purpose of tying it tightly around the opening through which the ether is poured, so as to prevent the entrance of air at this place. The bag should be made of close material, and when it is wet with water, it is impervious, or nearly so, to air or ether vapor.

Mode of Using the Inhaler.—When about to be used, the large tube is filled with a piece of coarse sponge, of proper size and shape, which has been previously wet with water and thoroughly squeezed. The bag is then wet and squeezed, so that it does not drip, and secured over the mouth of the tube. The sponge will hold two ounces of ether, which should be poured upon it through the opening on the top of the tube containing the sponge. In most operations the first charge of ether is all that is required, and in many, half the quantity mentioned is quite sufficient. The rubber hood is applied accurately over the mouth and nose, but the opening through which the anæsthetic is poured is left uncorked until tolerance or partial anæsthesia of the mucous membrane of the air passages is established, as indicated by deep inspirations. Free dilution of the ether vapor with atmospheric air when its administration is first begun, prevents in a measure the coughing and strangling that is liable to occur from the sudden application of the concentrated vapor.

The bag ordinarily lies upon the upper part of the chest, but in operations about the neck and upper part of the body, it may be placed to one side or the other, or upward over the face, by turning the sponge-holder on the rubber hood, the latter retaining its position.

ANÆSTHETIC.

Hutchison's Ether Inhaler (concluded).

The Advantages of the Inhaler.—The advantages which the writer believes this apparatus possesses are:

1st. The mechanical act of respiration is entirely free—"the lower end of the bag rises and falls with the respiration, without offering any practical obstruction to the mechanical process" (Squibb), and the breathing can be closely watched.

2d. No part of the instrument is liable to become soiled by expectoration or vomited matters, except the rubber hood, and this is easily cleaned—an advantage of no small importance for the antiseptic days. But it is better to throw the whole apparatus into a basin of water after each inhalation, to free the products of respiration. *No inhaler* should be used a second time without being thoroughly cleansed.

3d. The apparatus economizes ether, the first charge (two ounces) being usually sufficient for a long operation; it prevents, in a great measure, the vapor from permeating the apartment, and affecting the comfort of the operator and his assistants, and especially the anæsthetizer who often suffers from inhaling a large quantity of the vapor himself.

4th. It is simple in its construction, having no valves, and is inexpensive and portable.

The apparatus, together with a bottle or tin can containing four or six ounces of ether, may be carried in a tin case nine inches long and three and one-half inches in diameter, divided by a diaphragm in the middle—one side of the case for the ether bottle and rubber hood, and the other for the tin tube (the sponge being placed inside of it) and the bag.

FIG. 1254.—Speirs George's Inhaler.

The instrument consists of an oblong conical cylinder, which folds upon itself. Within the cylinder and near the top of the instrument, when extended, is a pocket, in which rests the flannel or sponge to receive the anæsthetic used.

The pocket is so constructed that a continuous column of air can pass between it and the sides of the inhaler proper. The top and sides of the inhaler contain slides, by means of which more or less air can be admitted or excluded as required during the administration of any anæsthetic. The top of the pocket is concave and perforated. The preparation used can be poured through the top, and the anæsthetic agent, falling upon the concave surface of the instrument, passes through the perforations alluded to, and is taken up by the sponge or flannel within the apparatus; thus enabling the practitioner to replenish the instrument, when required, without removing it from the face of the patient.

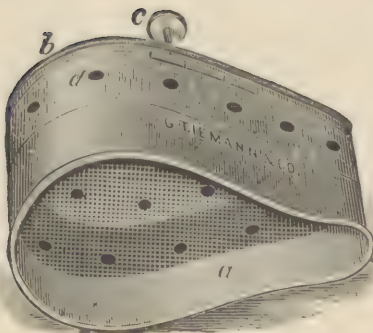
The interior of the instrument, when closed (which looks like a cup), contains a bottle, which can be kept filled with chloroform, ready for immediate use as required—as in cases of convulsions, diagnosis, obstetric practice, &c. Within the box containing the apparatus, is a flannel sack. This can be pulled over the instrument to keep it warm, when from long and continued use, and consequent evaporation of the anæsthetic, it becomes cold. Whenever desired, the instrument can be instantly removed from the face of the patient; and, when not in immediate use, the slides can be closed and the apparatus placed upon a pillow. The pillow, being soft, conforms to the bottom of the instrument, retaining the vapor within, to be again used from time to time as required.



FIG. 1255.—Mitchell's Ether Inhaler.

The accompanying wood-cut so clearly represents the instrument that an explanation of it is hardly necessary. This inhaler is made of tin. It is divided by a diaphragm of wire gauze into two nearly equal parts. The letter *a* shows the mouth-piece with the wire gauze inside and openings for the admission of air. The cover, *b*, opens by a hinge on the side, and allows the introduction of cotton cloth or other material, which lies on the top of the wire diaphragm, and receives the ether. There is a sliding button, *c*, which goes between the fingers, and facilitates the handling of the instrument. When not in use, this button slides in.

This inhaler has been thoroughly tested, and is recommended to the profession on the grounds of: 1. Durability; 2. Cleanliness; 3. Cheapness; 4. Economy of ether, the amount being far less than that consumed by other inhalers.



ANÆSTHETIC.

FIG. 1256.—Heuel's Ether Inhaler.

In apparatus for ether inhalation, the objects to be attained are, first, that it be more convenient, durable and economical, though just as simple, easily managed, safe, and cleanly as the towel cone; second, that it present no possible difficulty to free respiration, either by the inadequate diameter of its respiratory passages or by inhaling or exhaling valves, which are apt to get out of order; third, that it be self supplying, with the anæsthetic under perfect control, thereby avoiding the necessity of removing the instrument from the face to replenish with ether; fourth, that it present the air as nearly as possible saturated with ether, at the same time preventing its general diffusion outside of the body without impeding the patient's respiration; and, lastly, that it be inexpensive, and not bulky or cumbersome.

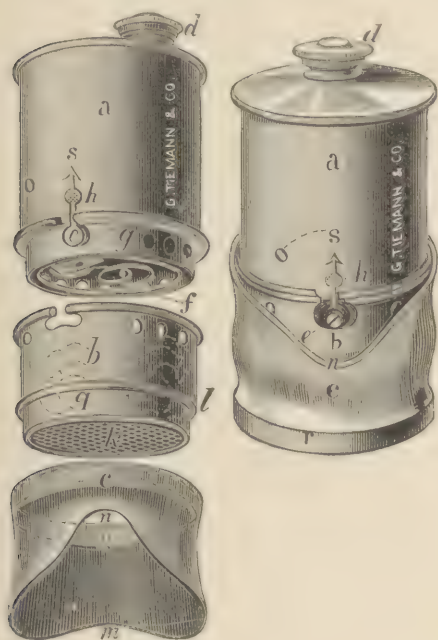
I have devised an inhaler, constructed for me by Messrs. Tiemann & Co. of this city, which overcomes in a satisfactory manner all of the difficulties enumerated above. I have used it in hospital and private practice for the last nine months, and have found that it practically fulfils the theoretical requirements of a perfect inhaler.

It is constructed of thin nickel-plated brass, with a rubber face-piece, and is, when closed for transportation, a cylinder six inches long by three inches in diameter, being of convenient size to carry in the pocket, and consists, as shown in the accompanying woodcut, of three parts, viz.: An ether reservoir, *a*; a respiratory chamber, *b*; and a face-piece, *c*; one placed below the other.

The ether reservoir is cylindrical in shape, holding about twelve fluid ounces. It has at the top, near the side, an opening, *d*, closed by a screw-cap and rubber washer for filling the reservoir. The screw-cap has drilled through its side, below the washer, a small opening, so that when unscrewed, before using the apparatus, by a few turns it will permit air to enter the ether reservoir to supply the vacuum left by the exit of ether through the stop-cock at the bottom.

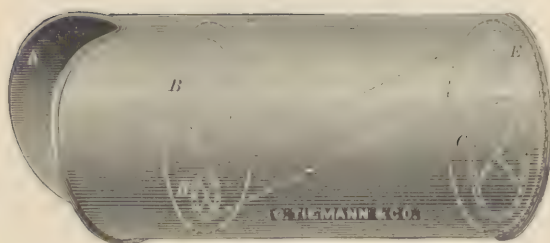
At the bottom of the ether reservoir, near the side, is an opening closed by a metal stop-cock, *e*, continuous with which, and in a plane parallel to and one-half inch below the bottom, is a spiral coil, *f*, of small copper tubing, having perforations about one inch apart on the top or side nearest the reservoir. This pipe runs from the stop-cock on the side straight to the centre, and then spirally straight toward the periphery. To steady it, it is soldered at its outer margins to a ring, *g*, projecting from the bottom of the reservoir. The stop-cock has attached to it an index hand and chequered button, *h*, which moves on the outside of the reservoir, and indicates when parallel to the long axis of the reservoir that it is closed, *s*; when moved away from this axis toward *o*, that it is being opened. The ring, *g*, projecting from the bottom of the reservoir, fits, by an accurate bayonet joint, into the top of the next cylinder, *b*, which is the respiratory chamber. Both the ring, *g*, and the top of the respiratory chamber are pierced with corresponding holes five-sixteenths of an inch in diameter and about three-eighths of an inch apart. These I will designate as the respiratory openings. The bottom of the respiratory chamber is slightly turned in, forming a shoulder upon which is fitted a disk of wire gauze, *k*, to retain the evaporating medium and protect it from expectorated and vomited matter. Around the outside of the respiratory chamber, and one half inch from the bottom, is soldered a piece of brass wire, *l*, to act as a shoulder to the top of the rubber face-piece, *c*, which fits over the bottom of the respiratory cylinder. Within the respiratory chamber and upon the wire gauze is packed washed sheep's wool, which I have found the best medium of evaporation for the ether, which drops upon it from the spiral coil above. Now it will be seen why the perforations in the copper coil are placed in the upper side, as the ether, when the inhaler is placed in the vertical position for use, must fill the entire coil before it can escape from the openings, thereby ensuring an equal distribution of the anæsthetic fluid. For the same reason the coil is first run straight from the stop-cock to the centre of the ether reservoir, and then spirally to its periphery, as the inhaler, when in use, cannot always be kept in a strictly vertical position.

The face-piece, *c*, is made of soft vulcanized rubber, shaped like a truncated cone, with notches for the chin, *m*, and nose, *n*, to more accurately fit it to the face. Being made of soft rubber, it adapts itself equally well to a round, thin, large or small face, a prominent or a flat nose. It will answer as well for a child as for an adult. In the former the chin must be placed within the face-piece, the rubber then covering the nostrils, mouth, and entire chin. In the latter a notch, *m*, in the rubber fits on the chin. At the top, and within the face-piece, a metal ring, *p*, is baked on, which firmly fits over the bottom, *q*, of the respiratory chamber.



ANÆSTHETIC.

FIG. 1257.—Morton's Ether Inhaler.



rapid evaporation of the ether with which the wool is saturated. *C* is the opening for introducing the ether, one-half a drachm, or even less, of which is sufficient to begin with.

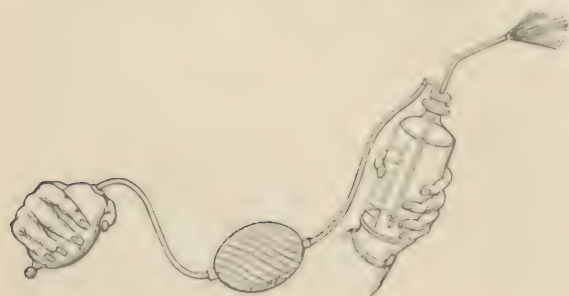
The inhaler may be withdrawn from time to time, to avoid irritating the larynx, until the patient gets accustomed to the vapor; then ether may be added, as the case requires, and the patient will be found to pass quietly under its influence.

FIG. 1258.—Junker's Methylene Inhaler.



be held in a button-hole of the operator's coat or vest. To guard against being easily broken, as well as for protecting the methylene against the action of light, it is covered with leather, preferably of yellow or light blue color, leaving only the graduated scale free for observation. When the air-bag is worked, the methylene in the bottle is agitated and vapor formed, which may be inhaled by the patient in the same way as usual with other inhalers. It has been used by Drs. Junker, Richardson and others with more or less success.

FIG. 1259.—Richardson's Atomizer, for local anæsthesia.



be thrown is surprising. The jet is steady, there being pretty uniform pressure kept up by the regulating power of the netted bag, which, by virtue of its elasticity, compresses the air in it during the intervals of manipulation upon the hand ball. *Our tubes, being made of silver, do not form verdigris* (a serious objection to instruments made of inferior metals). *This atomizer is also the best douche for bathing sensitive eyes, inflamed sores, &c.* Suitable forms made for the eustachian tubes, uterus, urethra, posterior nares, or any part of the body accessible to instruments.

If the capillary tube should become obstructed, clear it with fine soft wire.

It is a simple cylinder of leather, of which *A* represents the face-piece, with thinned and pliable edges to admit of close adjustment. *B* is an inlet valve, permitting of inspiration through the ether-chamber, but closing against expiration. *D* is the entrance orifice of a metal tube leading through the wool-packed ether-chamber to *E*, the exit valve, which closes with inspiration—opening with expiration; this tube is for the purpose of collecting the heat of the exhaled breath and communicating it to the surrounding wool, thus favoring

The apparatus for using methylene as an anæsthetic consists of a face-piece to cover the nose and mouth, having an arrangement to admit more or less air at the apex. This connects by means of rubber hose to one end of a double branched metal tube running through a rubber stopper: the other branch of the metal tube connects by rubber hose to a set of air bags with valves, such as are used for Richardson's ether-spray. The stopper fits tightly a glass graduated bottle of fifteen drachms capacity. This has a hook attached to its neck by which it may

After filling the bottle two-thirds full with the solution, operate the end ball briskly; this will extend the netted ball and force a current of air into the cavity of the silver tube. This column of air, being disproportionately large compared with the aperture of the tube, becomes compressed and exerts, *first*: an influence upon the surface of the fluid (which is forced by it into the capillary tube; *secondly*: a pressure upwards, escaping through the orifice at its tip. This continued upward current of air divides into spray the drops collected at the extremity of the capillary tube. The force with which this spray can

ANTISEPTIC.

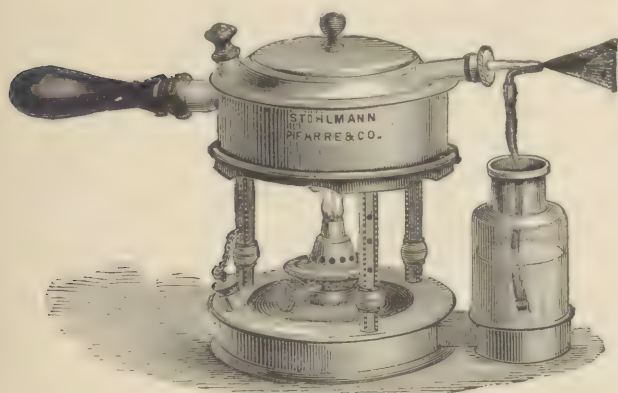
FIG. 1260.—Hank's Antiseptic Spray.



The stand, boiler and lamp correspond in design to the common atomizer, now so generally used for inhalation purposes, but are much larger. The open glass vessel for holding the antiseptic fluid has a capacity of one pint, and is held in position over the boiler in a shallow metal cup. The latter is made to move forward and backward by means of a thumb-screw, which is attached to an erect rod, fastened at the base of the apparatus. The rod in the cut is necessarily concealed from view. There is a small stop-cock arrangement low down at the side of the glass vessel, thus regulating the amount of antiseptic fluid which flows downward to the atomizing points. The long metal arm, into which is fastened in the usual manner the glass or metal spray-producer, is attached to the boilers by a kind of elbow-joint, thus enabling the spray to be projected forward at any angle. The alcohol lamp has a large tube for the wick, and over this is a second tube which slides up and down by means of a ratchet. The handle of the ratchet is seen in the cut. It readily controls the size of the blaze, the degree of heat, and the amount of steam produced. Great care should be exercised in selecting a suitable atomizing point. With a proper point a coarse or fine spray may be produced, according to the amount of antiseptic fluid admitted through the stop-cock. The force of the spray will depend upon the *blaze*, and the consequent amount of steam; and the angle of the arm will regulate its direction.

The apparatus thus constructed will supply a suitable spray for two hours' operation, as the antiseptic fluid can be replenished as required. I claim for it its portability, small size, safety, durability and cheapness. It contrasts favorably in every way with the Lister or Sass apparatus.

FIG. 1261.—Weir's Antiseptic Spray.

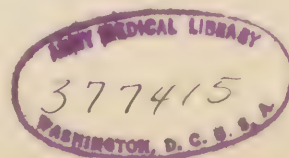


"The best spray-producer is that devised by Lister himself. It is, however, quite costly, ranging in price from fifty to seventy-five dollars, and it was to meet this objection that the one before you has been constructed. With its diminished cost some of the improvements of Mr. Lister's lamp have been sacrificed. It is, however, essentially the same. Its hollow wick, readily raised or lowered, affords a great and controllable heat. The spray-tube is in this apparatus fixed, an objection which in the majority of cases is of no moment. It will supply spray for over two hours. It therefore requires only that the boiler—containing twenty-two ounce—should be, as well as the lamp, full at the beginning of the operation; and, with this precaution, it has been found practicable to dispense with the expensive

and tell-tale windows of glass belonging to the original imported instrument. The accompanying wood-cut gives a good representation of this lamp."

Further directions for its use have been supplied us by Dr. Weir, viz.:

"The lamp should be filled with alcohol at the beginning of an operation and the stopper removed from the side opening when the wick is lighted. Prior to filling the boiler with water (preferably hot) it is desirable to ascertain that the spray-tube is free by sucking or blowing through it, and also that the escape valve works properly. If the latter is stiff, a drop of oil or glycerine should be introduced from above. When the boiler is yet quite full, the spray-tube should not be depressed very much, in order to avoid the exit of hot water. If the spray-tube is too coarse, the end of the rubber tubing immersed in the carbolic acid solution may be plugged with cotton or sponge, or the tubing itself may be narrowed by a thread loosely tied around it. Should the spray-tube become choked during an operation, a small wire, such as comes with a hypodermic syringe, can be resorted to, to clear it.



ANTISEPTIC.

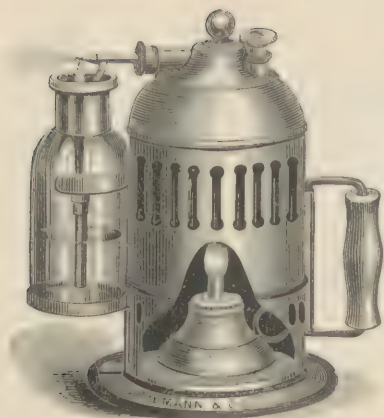


FIG. 1262.—Little's Antiseptic Spray.

This is Tiemann's Steam Inhaler, altered at my suggestion, so as to give a good spray. It answers well for dressing wounds. For large operations, it is necessary to use the large spray apparatus, this small one answering well for subsequent dressings. Mr. Lister uses a still smaller one for this purpose, which he carries in the pocket. This small one will work for over an hour. The best instrument is the one which makes the finest spray, it wetting and numbing the hands but little, and causing the fluid to last longer, while producing as good an effect upon the tissues. The spray-tube, in order to accomplish this, should be of small calibre. Always be careful to see that the safety-valve is right before you use it.

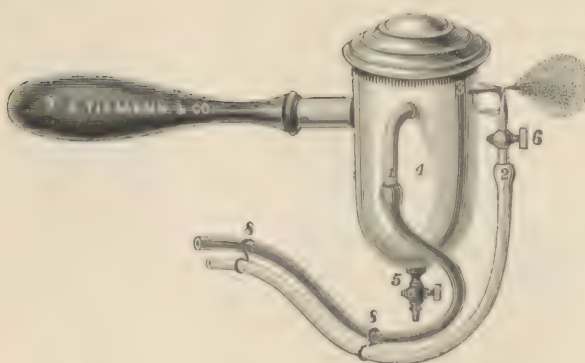


FIG. 1263.—Heuel's Antiseptic Spray.

The apparatus represented in the accompanying cut is a modified apparatus for use in antiseptic surgery. The modification consists in the addition of two flexible rubber tubes and a steam-chest to the ordinary atomizing apparatus used for inhalation purposes, and may be readily attached by the physician himself to any of the atomizers now used. In the annexed figure, 4 is a steam-chest, to the upper part of which is soldered, at 3, the ordinary metal atomizing tubes, and at the side a tube, 1, to which is to be attached a piece of flexible rubber steam tubing, for carrying steam from a boiler: opposite 3 is a wooden handle, 7, for holding the apparatus, and at the lowest part of the chest is a stop-cock, 5.

The rubber tube, 2, delivering the medicated fluid, is also furnished with a stop-cock, 6, so that the amount of fluid atomized may be varied at pleasure. The steam water tubes, 1 and 2, are held together by a figure-of-eight piece of wire, so that they may be handled as if they were but one tube.

As is readily seen, the length of these tubes may be varied to suit the occasion, only remembering that the longer the tubes, the greater the pressure of steam required, and the higher must the vessel containing the medicated fluid be placed, in order to deliver it at the opening of the tube, 2. The steam, which condenses in the tubing and steam-chest, is allowed to escape, when necessary, through the stop-cock, 5, so that the patient is not scalded by a jet of hot water.

The use of long flexible tubes, combined with the steam-chest, permits the boiler of this apparatus to be placed at such a distance that all danger of explosion, when ether is used, is avoided, as well as all interference with the operator. The force, amount and direction of the spray can also be varied at pleasure. In the ordinary atomizers the whole apparatus must be placed unpleasantly close to the patient; in this a very light portion is readily supported and directed by the hand without fatigue.

ANTISEPTIC KNIVES.

Esmarch has devised Antiseptic Knives made of one piece of steel, so as to afford no lodgment for septic germs, which might possibly adhere to ordinary knives. One objection to these is, that the handles become quite slippery if wet with blood; in order to obviate this, we have made, at the suggestion of Dr. Weir, antiseptic knives of which the handles are baked on, of hard rubber, but containing no crevices whatever. Any instrument constructed in this way is as if made of one piece, and affords the perfect customary hold.

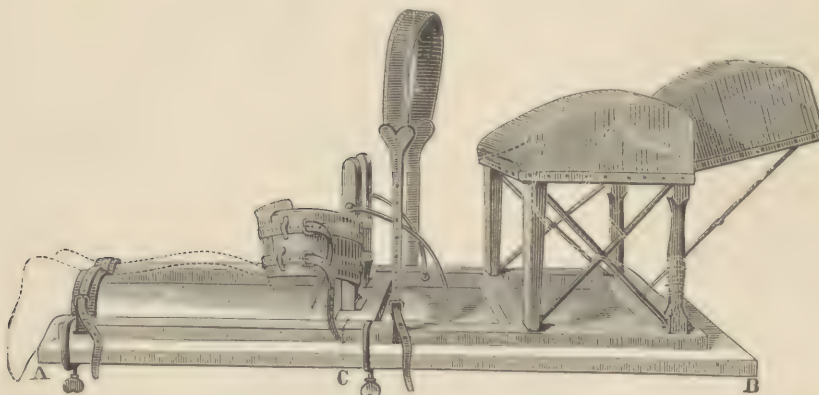
COUSIN'S ANTISEPTIC TROCAR AND KNIFE.

After the existence of fluid has been determined by the trocar, the inner tube, or stillet, can be removed and a proper pointed knife, fitting the tube exactly and made so as to leave a cutting edge one and one-quarter inches in length, can be introduced. The direction of the knife is shown by a mark on the handle.

This instrument may prove useful in cases of deep-seated abscesses and empyema.

OPERATING FURNITURE.

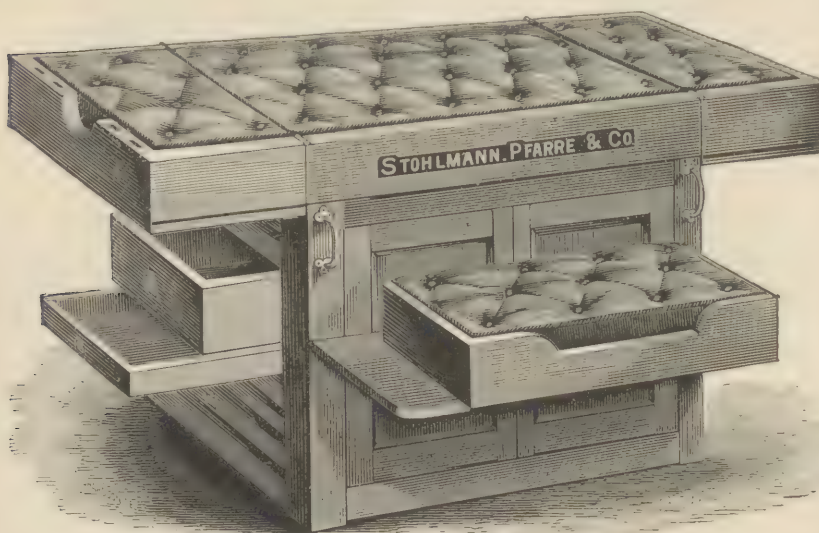
FIG. 1264.—Bozeman's Operating Chair.



For placing and securing the patient in the knee-elbow position for the operation of Vesico-Vaginal Fistula, Vaginal Ovariectomy, &c.

This apparatus not only completely secures the patient in this position, by straps and braces, but insures perfect comfort for any length of time, and also favors the administration of an anæsthetic.

FIG. 1265.—Foster's Combined Gynæcological Table and Instrument Case.



For the past two or three years I have used with great satisfaction an examining table, the chief features of which may be described as follows: when not in use it forms a close case three feet long, two feet wide and about three feet in height—forming rather a handsome article of furniture, not at all suggestive of the purposes for which it is chiefly meant. The greater portion of it serves to hold instruments and other appliances—one-half of this portion being taken up by a series of drawers, and the other half forming a closet.

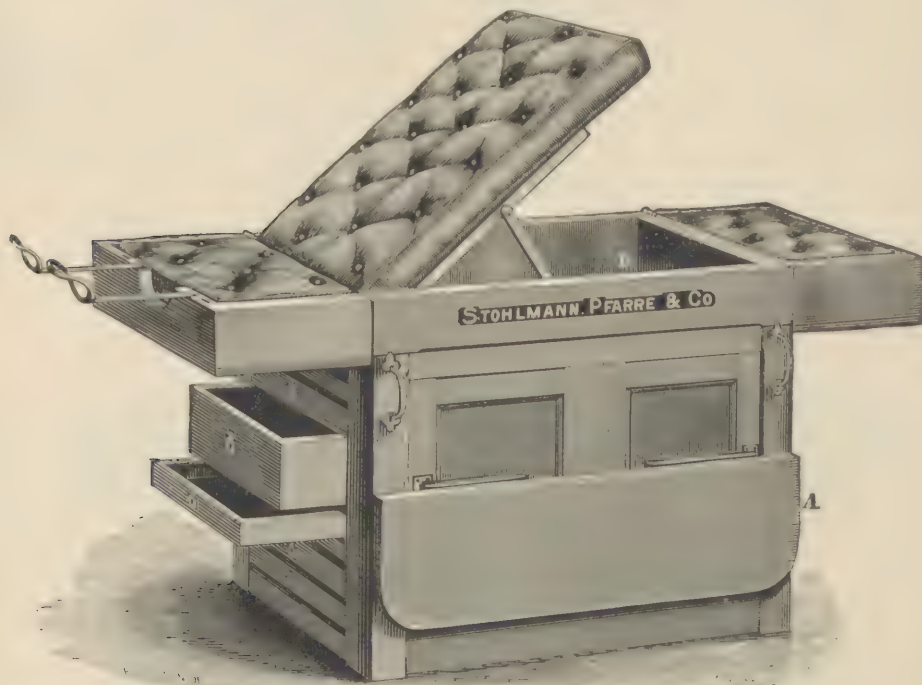
The upper part of the table consists of a couch, folded together somewhat after the manner of a bagatelle table. The central section of this couch extends the whole length of the closed case—three feet. To either end of this por-

OPERATING FURNITURE.

Foster's Combined Gynæcological Table and Instrument Case (continued).

tion is hinged a lid one foot wide, making the couch, when opened for use, five feet long, furnished with hair cushions covered with leather. In this state it is a simple horizontal couch, of convenient height and dimensions for examining patients of either sex in the reclining posture. The patient's head may rest upon a small separate cushion, which cushion, when the table is not in use, is contained in a third lid, which serves to fill up the space between the two hinged lids above referred to. At the rear of the table is a hinged step, resting, when in use, on swinging brackets. Partial pronation of the body is thus facilitated, without the unpleasant effects sometimes produced by a table having a lateral pitch throughout its whole length. Moreover, from the hips resting at a higher level than the trunk, a slight lateral bending of the spine is caused, bringing the vagina more nearly parallel with the rays of light which are depended on for illumination—reaching the room, as they generally do, from a point somewhat higher than the table. In an examination of this sort, the stirrup for the right foot projects from the side of the table—the one for the left foot, diagonally from the corner.

FIG. 1266.



For an examination with the patient lying on the back, the central portion of the couch may be raised to any convenient pitch, as shown in Fig. 1266. The stirrups, or foot supports, are simply inserted into sockets in the frame of the couch, so situated that the distance between the feet may be varied according to circumstances. The shape of the stirrups is correctly shown.

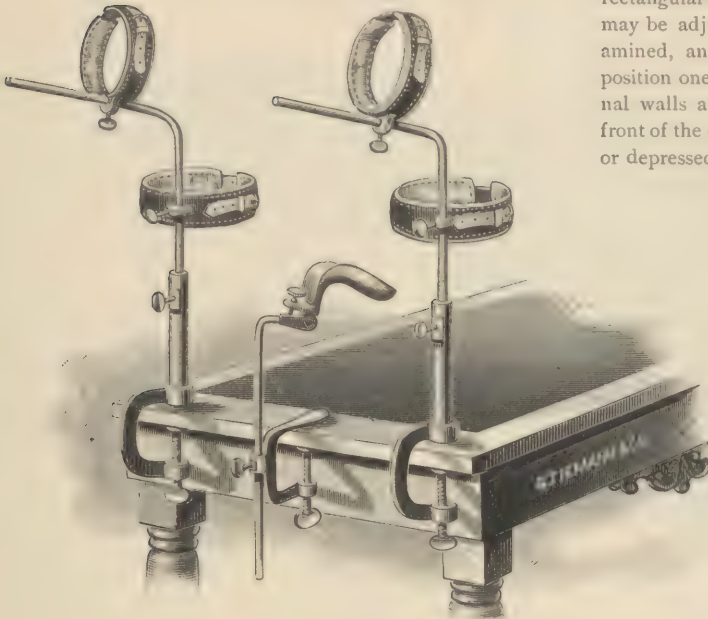
For an examination in Sims' posture, one end of the cushion upon which the hips rest (the end corresponding to the operator's left hand, as he faces the patient), is raised, so that that portion of the couch slopes towards the right.

For the knee-elbow posture, the patient's knees may rest upon the step, the middle lid, with its cushion, being interposed, as shown in Fig. 1265. For the knee-chest posture, the table is arranged in the main as shown in Fig. 1266, but the middle lid, with its cushion, is placed at B. The patient's knees rest upon this, and the trunk upon the declivity formed by the central portion of the couch.

The deep drawer may be conveniently partitioned into compartments for bottles, jars, cotton wads, a vessel of warm water, &c.; the others are for instruments. From the fact that the end of the couch overhangs the body of the table, these drawers may be opened without obliging the operator to retreat from the patient.

OPERATING FURNITURE.

FIG. 1267.—Comstock's Gynapod.



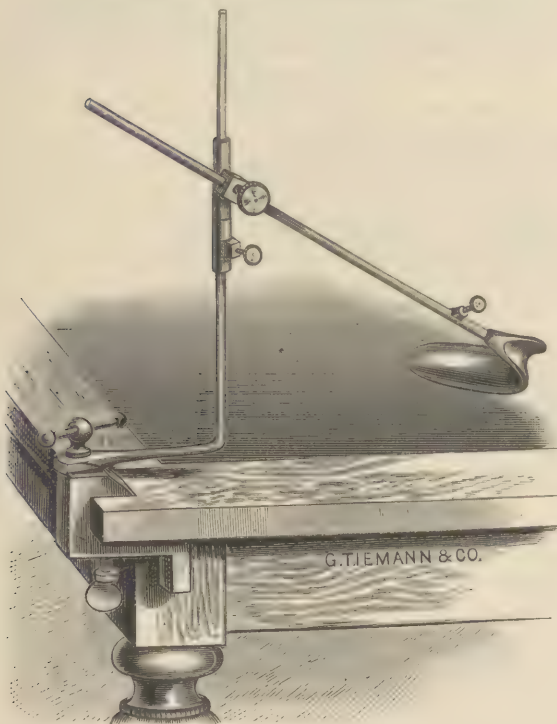
Explanation.—The cushioned bands slide on the rectangular rods, and are fastened by screws. They may be adjusted so as to fit any female who is examined, and will support her limbs and make her position one of perfect ease, so that the uterus, vaginal walls and perineum are all placed directly in front of the operator. The leg braces may be elevated or depressed in their sockets, to suit the operator, for

the minor operations upon the vagina, uterus and urethra, and, especially, for the more important operations, such as laceration of the cervix, vesico-vaginal fistula, fistula in ano, cystocele, rectocele, &c. It will also be found very practical in the lateral operations for lithotomy. We will suppose a patient to be placed upon her back (ano-dorsal position); the leg-braces, that are represented in the cut, are rectangular rods, dropped into the two upright standards which are made of gas pipe, and may be fastened to a table, or to any gynecological chair, by means of simple clamps screwed to the table or chair; the rectangular rods are provided

with cushioned bands for the limbs to rest in. The rods may be raised or lowered, and turn outwards or inwards to suit the convenience of the operator.

When the patient is placed in this position, a Simon's adjustable gutter speculum may be introduced, and is held in position by a small clamp, also screwed to the table; this speculum is a perineal retractor, the same as Sims'; or the speculum of Boze-man may be used, one of the best vaginal retractors that I have ever tried. It is self-retaining and may be conveniently introduced, so that the screw is placed upwards, and rests upon the mons veneris. If some minor operative proceeding is required, such as an intra-uterine application or the removal of a polypus, an ordinary bivalve speculum may be used, *e. g.*, Brewer's, Hale's or Higbee's. In secondary operations upon the perineum, the leg braces will be found very practical; in vesico-vaginal fistula, when using the gynapod, the anterior wall of the vagina will be situated *directly opposite to the operator*, and he can freshen easily and completely the fistulous margins of the rent, and then insert the sutures with much greater facility and accuracy than when the patient is placed, as is usual, in the lateral position or upon her hands and knees.

FIG. 1268.—Foster's Speculum Holder.



FOSTER'S SPECULUM HOLDER consists of a round rod, bent at right angles, which may be secured by means of clamps to any operating table, the free end

extending up perpendicularly. On one end of another straight rod is adjustably secured by a set screw, a Sims' Speculum. The free ends of both rods move through a double socket, and set screws permit the speculum to be fixed in any position desired by the operator.

OPERATING FURNITURE.



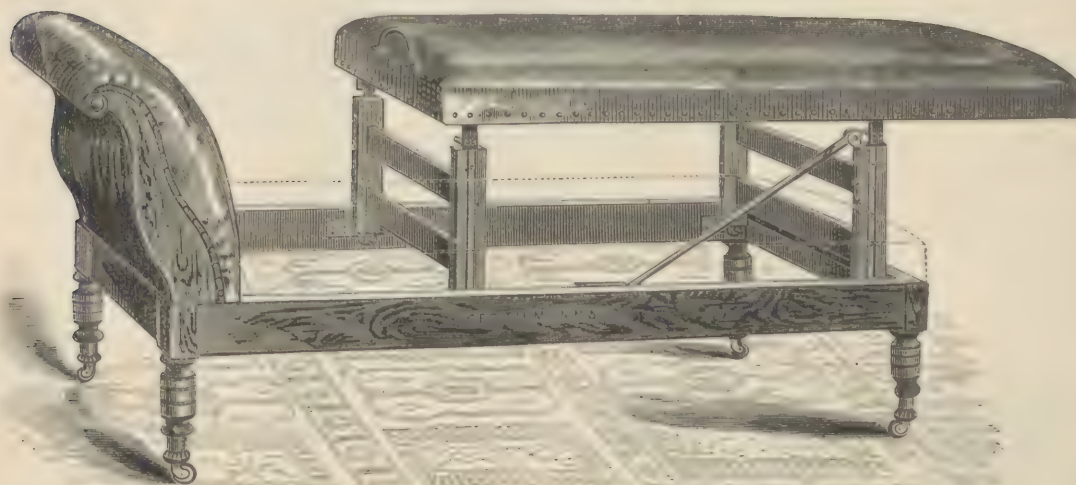
FIG. 1269.—Knapp's Oculists' Operating Chair.

Designed by Prof. H. Knapp.

It will put the head in any position.
 It will, by means of two jaws, hold the head steady.
 The back will rise to suit the height.
 It will lower down the back or place at any incline.
 The seat will rise and the back will lower to operate on a child.
 Foot-piece rises up and draws out to support the limbs.

Upholstered in Leather, Irons Nickel Plated.

FIG. 1270.—Little's Operating Lounge.

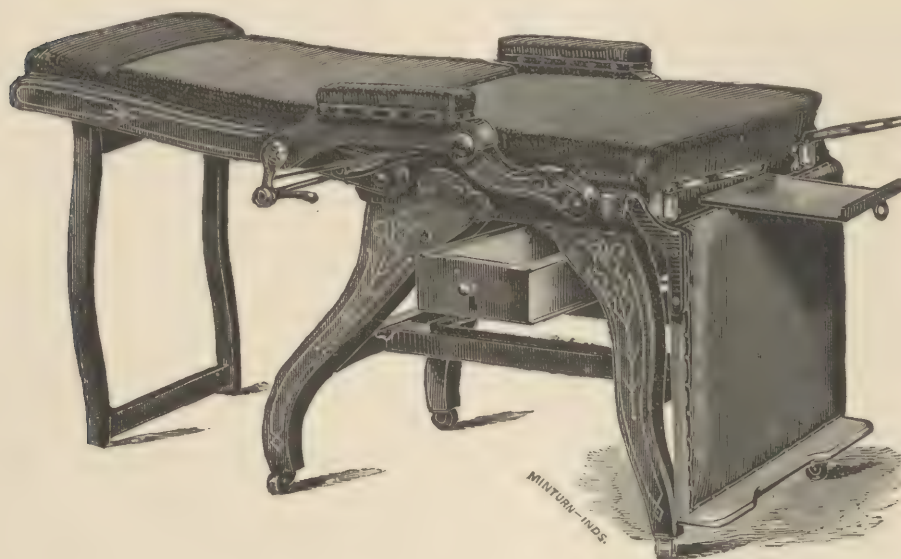


Black Walnut Frame, Upholstered in Leather.

The appearance and proportions of the Operating Lounge and Table, designed by Dr. Little, are those of the usual style of lounge, and it may be used as such in the office. It is very handy for examination and reduction of ruptures, the convenient application of trusses, and for performing an operation on any part of the body. The seat or bed may be raised by taking hold of the loop-handle near the cushion and pulling it up, when a stay will fall in place and secure the bed in an elevated position, in the usual height convenient for operations. The illustration represents the bed or seat of the lounge raised. If it is to be used for gynecological examinations, or for operations and applications to vagina or uterus, &c., the two foot rests concealed on the lower extremity may be pulled out, against which the feet of the patient are placed, as usual in such cases. By lifting the lower end of the stay, the bed is put back in its position, indicated by the dotted lines. There are no racks, pinions or windlasses, nothing to get out of order, and when not in use for an operation it forms as neat a piece of office furniture as any that has not the additional advantages of this lounge.

OPERATING FURNITURE.

FIG. 1271.—The "Clark" Physicians' Office Chair, for the Practice of Gynæcology, Surgery, and all office purposes.

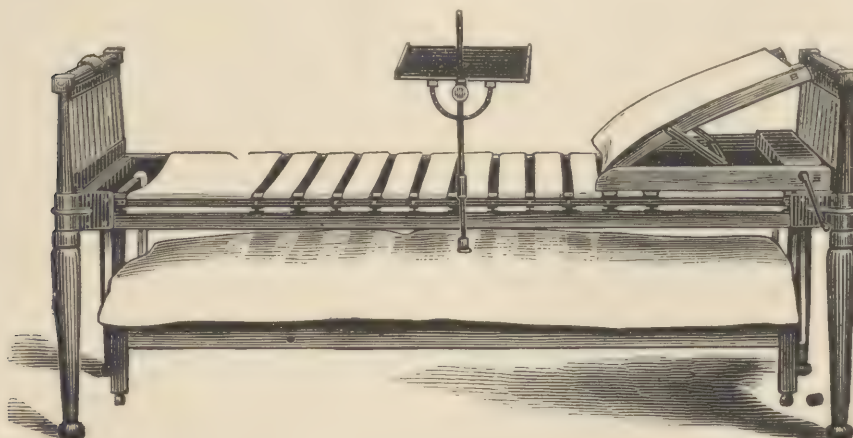


The chair is very simple in its adjustments, absolutely noiseless, and can be placed at any angle, with the patient in or out of it. The design is simple, unique and beautiful. It is the proper height, does not have to be raised or lowered by ratchet in the presence of nervous patients, and does away with all embarrassments to both physician and patient, on account of its ready adaptability in all cases of emergency.

The chair has a side table, quilted back and seat double stitched before the leather or plush is put on. All irons, except under drawer and rod on back chair, are nickel plated.

Dimensions: Length, 6 feet; height, 28 inches; width, inside of arms, 21 inches.

FIG. 1272.—The Crosby Invalid Bedstead. (Patented.)



It affords easy access to the body—permitting the bed-clothes to be changed, and the bed made up, securing perfect cleanliness, without fatigue or annoyance, and allowing defecation to be performed without moving the patient.

One person can perform all the necessary duties to a sick person, make up the bed, wash and ventilate the body, dress bed-sores, and use the bed-pan, without assistance or disturbing the patient.

GENERAL OPERATING.

Buck's General Operating Set.

\$190.

- 1 Liston's long Knife, Hip and Thigh.
- 1 Liston's medium Knife, Leg and Arm.
- 1 Metacarpal Knife, large.
- 1 Straight Bistoury, ferruled handle.
- 1 Curved Bistoury, sharp point.
- 1 Curved Bistoury, probe point.
- 1 Hernia Bistoury.
- 1 Tenotome.
- 4 Scalpels, assorted sizes.
- 1 Tenaculum.
- 1 pair Crampton's Artery Needles.
- 1 Double-pronged Hook.
- 1 Beer's Cataract Knife.
- 1 Desmarre's Scarifying Knife.
- 1 Straight Eye Needle.
- 1 Curved Eye Needle.
- 1 Gouge and Spud for removing foreign bodies from the eye.
- 1 Folding Probang with silver Bucket.
- 1 Long Bullet Probe, German silver.
- 1 Nelaton's Bullet Probe.
- 1 pair German silver Retractors.
- 1 Double silver Trachea Tube.
- 1 Curved Rongeur, with spring.
- 1 Ferguson's Bone-Holding Forceps, lion jaw.
- 1 pair Liston's Bone Forceps.
- 1 pair Sequestra or Toe-nail Forceps.
- 1 Small Straight Trocar and Canula.
- 1 Ferguson's Bone-holding Forceps, crow-bill.
- 1 Rectum Trocar and Canula, curved.
- 2 Gouges.
- 2 Chisels.
- 1 Straight Trocar and Canula, large size.
- 1 pair Lithotomy Forceps.
- 1 Glass Ear Speculum.
- 1 Tourniquet.
- 4 Silver Catheters, Nos. 3, 6, 9, 12.
- 1 Tiemann & Co.'s Bullet Forceps.
- 1 Steel Director.
- 1 pair Coxeter's Forceps.
- 2 Vulsellum Forceps.
- 1 pair Eye Scissors, curved on the flat.
- 1 pair heavy Scissors, angular curve.
- 1 Lithotomy Bistoury.
- 1 Wire Ecraseur.
- 1 pair Spring-catch Artery Forceps, fenestrated.
- 1 pair Buck's Throat Forceps.
- 1 pair Polypus Forceps.
- 1 pair Strabismus Forceps.
- 1 Peters' Hernia Director.
- 1 Capital Saw.
- 1 Chain Saw, best.
- 1 Trephine and handle.
- 1 Metacarpal Saw, movable back.

- 1 Finger Saw, narrow blade.
- 3 Lithotomy Staffs.
- 3 Steel Bougies.
- 1 Syme's Staff.
- 1 Buck's Sponge Holder.
- 1 German-silver Eye Speculum.
- 1 Odema Glottis Instrument.
- 12 Needles, Silk, Wax, Plastic Pins.
- 2 coils Silver Suture Wire and 4 coils Iron Wire.
- 3 Silver Probes.
- 6 Serrefines.
- 1 Mahogany or Rosewood Case, brass bound, good French lock, lined with silk velvet.
- 1 Patent-leather Cover, water-proof.

Wood's General Operating Set.

\$74.55.

- 1 pair Silver Probes.
- 2 Steel Sounds.
- 1 Long Amputating Knife.
- 1 Circular Knife.
- 1 Catling.
- 1 Trepanning Scalpel with Raspatory.
- 1 Spiral Tourniquet.
- 12 Needles, Silk, Wax, Plastic Pins.
- 1 Trepanning Brush.
- 1 Metacarpal Saw.
- 1 Tiemann & Co.'s Bullet Forceps.
- 1 pair Straight Dressing Scissors.
- 1 pair Curved Eye Scissors.
- 1 Hey's Saw.
- 1 Silver-plated Catheter.
- 1 Gum-elastic Catheter.
- 2 Gum-elastic Bougies.
- 1 Capital Saw.
- 1 pair Liston's Bone Forceps.
- 1 Trephine and Handle, Galt's.
- 1 pair Spring-catch Artery Forceps, plain.
- 1 Trepanning Elevator.
- 1 Director, steel.
- 1 Beer's Cataract Knife.
- 1 Curved Sharp-pointed Bistoury.
- 1 Curved Probe-pointed Bistoury.
- 2 Scalpels.
- 1 Plain Aneurism Needle.
- 1 Tenaculum.
- 1 Strabismus Blunt Hook.
- 1 Straight Eye Needle.
- 1 Curved Eye Needle.
- 1 Curved Eye Forceps, Strabismus.
- 1 Rosewood, brass-bound Case, lined with oil-dyed patent velvet.

GENERAL OPERATING.

Post's General Operating Set.

\$150.95.

- 1 Granger's Sponge-Holder, gilt.
- 1 pair Dressing Forceps.
- 1 pair Polypus Forceps.
- 1 pair Strabismus Scissors.
- 1 pair Strabismus Forceps.
- 1 set Mott's Aneurism Needles.
- 1 pair Angular Scissors, heavy.
- 1 Kramer's Ear Speculum.
- 1 pair Liston's Bone Forceps, larger than usual.
- 1 Silver Female Catheter.
- 1 Metacarpal Saw.
- 6 English Gum Elastic Catheters
- 1 Medium-sized Trocar and Canula.
- 1 Probang, with Silver Bucket.
- 1 Nelaton's Probe.
- 1 pair Cilia Forceps.
- 1 Sharp-pointed curved Bistoury, with ferule.
- 1 Finger Bistoury.
- 3 Scalpels, assorted sizes.
- 1 Tenaculum.
- 1 Trepanning Scalpel and Raspatory.
- 1 Long Amputating Knife.
- 1 Blunt Hook.
- 2 coils Silver Wire and Silk.
- 1 Metal Bullet Probe.
- 1 Uvula Scissors, with claws.
- 1 Galt's Trephine.
- 1 Bone Trephine.
- 1 Trephine Handle.
- 1 Ebony Gorget.
- 1 pair Coxeter's Forceps.
- 1 pair Dressing Scissors.
- 1 Trepanning Elevator.
- 1 pair Spring-catch Artery Forceps, plain.
- 1 Rongeur.
- 1 Double Trachea Tube, silver.
- 1 pair Entropium Forceps.
- 1 Silver Catheter, No. 9.
- 1 Hey's Saw.
- 1 pair Mott's Retractors.
- 1 Japanned Tongue Depressor.
- 1 Rectum Trocar.
- 1 pair Sequestrum Forceps.
- 1 Wire Eye Speculum.
- 1 Tiemann & Co.'s Bullet Forceps.
- 1 Lachrymal Needle.
- 1 Tenotome.
- 1 Probe-pointed Bistoury.
- 1 Straight and 1 Curved Eye Needle.
- 1 Beer's Cataract Knife.
- 1 Medium-size Amputating Knife.
- 12 Suture Needles, Silk, Wax, Plastic Pins.
- 2 Silver Probes.
- 1 Director.

- 1 pair Vulsellum Forceps.
- 1 Capital Saw.
- 1 Rosewood brass-bound Case, lined with silk velvet.
- 1 Patent-leather Cover, water-proof.

Blackman's General Operating Set.

\$136.75.

- 1 Liston's long Knife, handle to unscrew.
- 1 Liston's medium Knife.
- 1 Catling.
- 1 Straight Finger Knife.
- 1 Capital Saw.
- 1 Aneurism Needle.
- 1 Tenaculum.
- 1 Narrow Finger Saw.
- 1 Lead Mallet.
- 1 Lithotomy Staff.
- 1 Chisel.
- 1 Gouge.
- 1 Rongeur with Spring.
- 1 pair Liston's Bone Forceps, large, with spring.
- 1 Elevator and Raspatory.
- 1 Sequestrum Forceps.
- 1 Lion-jaw Bone-holding Forceps.
- 1 Tiemann & Co.'s Bullet Forceps.
- 1 Universal Forceps, crossing.
- 1 Double Silver Trachea Tube.
- 1 Lead Bullet Probe.
- 2 Scalpels, with Ferules.
- 1 Curved Sharp-pointed Bistoury.
- 1 Curved Probe-pointed Bistoury.
- 1 Hernia Knife.
- 2 Blackman's Retractors.
- 18 Needles, Silk, Wax, Plastic Pins, Silver Wire, Iron Wire.
- 2 Silver Catheters.
- 1 Gum Elastic Catheter.
- 1 Straight Trocar.
- 1 Chain Saw, best.
- 1 Galt's Trephine and Handle.
- 1 Spiral Tourniquet.
- 1 Steel Director. 2 Silver Probes.
- 1 Eye Needle and Scoop on one handle.
- 1 pair Strabismus Forceps.
- 1 pair Dressing Scissors.
- 1 pair Dressing Forceps.
- 1 Wire Eye Speculum.
- 1 Double-current Catheter, silver.
- 1 Nelaton's Probe.
- 1 Horn Screw, to open jaw.
- 1 pair Artery Forceps, slide catch.
- 1 Rosewood Case, brass bound, lined with oil-dyed patent velvet.
- 1 Patent-leather Cover, water-proof.

GENERAL OPERATING.

Little's General Operating Set.

\$100.

Patent-leather Pouch for the Case, \$4.00.

- 2 Amputating Knives, one handle.
- 1 Bow Saw.
- 3 Scalpels, assorted.
- 1 Finger Bistoury.
- 1 Curved Bistoury, sharp-pointed.
- 1 Curved Bistoury, probe-pointed.
- 1 Hernia Bistoury.
- 2 Retractors.
- 1 Tenaculum.
- 1 Mouse-tooth Forceps.
- 1 Aneurism Needle.
- 1 Artery Forceps, fenestrated.
- 1 Artery Forceps, plain.
- 1 Torsion Forceps, Phelps'.
- 1 Sands' Needle Forceps.
- 1 Liston's Bone Forceps.
- 1 Tiemann's Bullet Forceps.
- 1 Nelaton's Probe (Tiemann's Spiral).
- 1 Spiral Tourniquet.
- 1 Director and Tongue-Tie.
- 1 Peters' Hernia Director.
- 1 Trocar and Silver Canula.
- 1 Polypus Forceps, curved.
- 1 Scissors, straight.
- 1 Scissors, curved on the flat.
- 1 Throat Forceps, Cusco's.
- 1 Trepanning Elevator.
- 1 Curved Rongeur.
- 1 Van Buren's Sequestrum Forceps.
- 1 Chisel. 1 Gouge.
- 1 Sayre's Periosteotome.
- 1 Galt's Trephine.
- 3 Steel Sounds, Nos. 10, 12, 14, one handle.
- 3 Plated Catheters.
- 1 Fine Silver Probe. 1 pair Silver Probes.
- Needles, Silk, Silver Wire, Plastic Pins, &c.
- In a Rosewood, Brass-bound Case, lined with oil-dyed silk velvet.

California General Operating Set.

\$69.30.

- 1 Capital Saw.
- 1 Amputating Knife, long.
- 1 Amputating Knife, medium.
- 1 Small Catling.
- 1 Scalpel.
- 1 Elevator and Raspatory.
- 1 pair Artery Forceps, spring-catch, plain.
- 1 pair Artery Forceps, slide-catch, bulbous points.
- 1 Tourniquet.

- 1 Trocar, straight.
- 1 Tongue Depressor, japanned.
- 1 pair Liston's Bone Forceps.
- 1 Galt's Trephine and Handle.
- 1 Steel Director.
- 1 Straight Bistoury.
- 1 Curved Bistoury, probe-pointed.
- 1 Curved Bistoury, sharp-pointed.
- 3 Scalpels, assorted sizes.
- 1 Tenotomy Knife.
- 1 Aneurism Needle.
- 1 pair Polypus Forceps.
- 1 Hey's Saw.
- 1 Metacarpal Saw.
- 1 pair Dissecting Scissors.
- 1 Double Hook.
- 1 Green's Tonsil Bistoury.
- 12 Needles, Silk, Wax, Plastic Pins.
- 1 Probang.
- 1 Catheter, German silver, plated.
- 1 Metal Bougie.
- 1 pair Tiemann & Co.'s Bullet Forceps.
- 1 Mahogany Case, lined with oil-dyed velvet.

Markoe's General Operating Set.

\$67.45.

- 1 Liston's Knife, long.
- 1 Liston's Knife, medium.
- 1 French Finger Knife, long.
- 1 Straight Bistoury, sharp-pointed.
- 1 Curved Bistoury, sharp-pointed.
- 1 Curved Bistoury, probe-pointed.
- 1 Cooper's Hernia Knife.
- 2 Scalpels, assorted.
- 1 Tenotome.
- 1 Tenaculum.
- 1 Aneurism Needle.
- 12 Needles, Silk, Wax, Plastic Pins.
- 1 Tourniquet.
- 1 Chisel.
- 1 Metacarpal Saw. 1 Hey's Saw.
- 1 Trepanning Elevator and Raspatory.
- 1 pair Artery Forceps, plain.
- 1 pair Artery Forceps, spring-catch, fenestrated.
- 1 pair Vulsellum Forceps, long.
- 1 pair Toe-nail Forceps.
- 1 Capital Saw.
- 1 Galt's Trephine and Handle.
- 1 pair Parker's Retractors.
- 1 pair Liston's Bone Forceps.
- 1 Gouge.
- 1 Silver Catheter, male.
- 1 Steel Sound.
- 1 Rosewood Case, lined with oil-dyed patent velvet.

GENERAL OPERATING.

Seymour's General Operating Set.

\$176.70.

- 1 pair Tiemann & Co.'s Bullet Forceps.
- 1 pair Polypus Forceps.
- 1 Trepanning Elevator and Raspatory
- 1 Exploring Trocar.
- 1 pair Artery Forceps, plain
- 1 Steel Director.
- 1 Metacarpal Saw.
- 1 Bow Saw, 2 blades.
- 1 Hey's Saw.
- 1 Trepanning Brush.
- 2 Blackman's Retractors.
- 1 Double Trachea Tube, silver.
- 3 skeins Silk, Iron Wire.
- 6 Double Bougies, s. s., Nos. 1 to 12, nickel-plated
- 3 Silver Catheters, Nos. 3, 6, 9.
- 3 Gum Elastic Catheters, best English.
- 1 Lithotomy Staff.
- 1 pair Harclip Scissors, straight, heavy
- 1 pair Scissors, curved on the flat.
- 1 set Mott's Artery Needles.
- 4 Serrefines.
- 2 coils Silver Wire, Plastic Pins
- 1 Liston's Knife, long.
- 1 Long Catling.
- 1 Screw Handle, for both.
- 1 Liston's Knife, medium.
- 1 Catling, narrow.
- 1 Finger Knife, long, narrow.
- 1 Cartilage Knife, heavy, ebony handle.
- 1 Tenaculum.
- 1 pair Artery Forceps.
- 1 pair Artery Forceps, self-closing, bull dog.
- 1 Chain Saw, best.
- 2 Silver Probes.
- 1 Bullet Probe, lead.
- 1 Bullet Probe, whalebone.
- 1 Nelaton's Bullet Probe.
- 3 Scalpels, assorted.
- 1 Curved Bistoury, sharp-pointed.
- 1 Curved Bistoury, probe-pointed.
- 1 Hernia Knife.
- 1 Spud and Gouge, for removing foreign bodies from the eye.
- 1 pair Gullet Forceps.
- 1 Galt's Trephine.
- 1 Bone Trephine.
- 1 Trephine Handle.
- 1 Trocar and Canula, straight.
- 1 Rectum Trocar and Canula.
- 1 Lead Mallet.
- 1 Chisel.
- 1 Gouge.
- 1 set Brainard's Bone Drills.
- 2 Ear Specula, porcelain.

- 1 pair Liston's Bone Forceps, with spring, extra large.
- 1 pair Sequestrum Forceps, with spring.
- 1 Rongeur, with spring.
- 1 pair Satterlee's Bone Forceps, small.
- 1 Tourniquet.
- 1 Horn Jaw Screw.
- 1 Rosewood Case, lined with oil-dyed velvet.
- 1 Patent-leather Cover, water-proof.

Parker's General Operating Set.

\$104.90.

- 1 Liston's Amputating Knife, screw handle.
- 1 Liston's Amputating Knife, medium size.
- 1 Small Catling.
- 1 Capital Saw.
- 1 Metacarpal Saw.
- 1 German-silver Wire Eye Speculum.
- 1 Hey's Saw.
- 1 Trepanning Elevator and Raspatory.
- 1 Galt's Trephine and Handle.
- 1 Finger Knife.
- 1 Curved Probe-pointed Bistoury.
- 1 Curved Sharp-pointed Bistoury.
- 1 Cooper's Hernia Knife.
- 3 Scalpels, assorted.
- 1 Cataract Knife.
- 1 Parker's Lachrymal Needle.
- 1 Exploring Trocar.
- 1 Director, steel.
- 1 pair Probes, silver.
- 1 Tiemann & Co.'s Bullet Forceps.
- 1 Tenotome.
- 1 pair Parker's Retractors.
- 12 Needles, Silk, Silver Wire, Plastic Pins.
- 1 Small Trocar, straight.
- 1 Rectum Trocar, curved.
- 1 pair Artery Forceps, plain.
- 1 pair Polypus Forceps.
- 1 Steel Sound.
- 2 Lithotomy Staffs.
- 1 Lithotomy Bistoury.
- 1 pair Lithotomy Forceps.
- 1 pair Liston's Bone Forceps.
- 1 pair Eye Scissors, curved on the flat.
- 2 Silver Catheters.
- 1 Spiral Tourniquet.
- 1 Eye Needle, curved.
- 1 set Parker's Aneurism Needles.
- 1 pair Strabismus Forceps.
- 1 pair Artery Forceps, spring-catch, plain.
- 1 Rosewood Case, brass bound, lined with silk velvet.
- 1 Patent-leather Cover, water-proof.

GENERAL OPERATING.

Hamilton's General Operating Set.

\$101.85.

- 1 Long Catling, Hip, 16 inches long.
- 1 Long Catling, Thigh, 13 inches long.
- 1 Liston's Knife, Leg and Arm, 13 inches long.
- 1 Broad French Bistoury.
- 1 Narrow French Bistoury.
- 1 Probe-pointed Bistoury, ferule handle.
- 1 pair Liston's Bone Forceps.
- 1 Capital Saw.
- 1 Narrow Metacarpal Saw.
- 1 Tenaculum.
- 1 pair Slide-catch Artery Forceps, Torsion.
- 1 pair Spring-catch Artery Forceps, fenestrated.
- 1 pair Dressing Scissors, straight.
- 1 pair Strong Harelip Scissors.
- 1 pair Dressing Forceps.
- 1 pair Tiemann & Co.'s Bullet Forceps.
- 1 U. S. A. Bullet Forceps.
- 1 German-silver or Whalebone Bullet Probe.
- 6 Serrefines.
- 12 Needles, Silk, Wax, Plastic Pins.
- 1 Spiral Tourniquet.
- 1 Field Tourniquet.
- 1 Long Director and Ear Spoon.
- 1 Conical Trephine.
- 1 Bone Trephine.
- 1 Trephine Handle.
- 1 Trepanning Elevator with Raspatory.
- 1 Hey's Saw.
- 1 Tirefond.
- 1 Hard-rubber Dental Syringe.
- 1 set Mott's Aneurism Needles.
- 1 pair Plain Artery Forceps.
- 1 pair Mott's Retractors.
- 1 pair Long Cotton Forceps (bird stuffing).
- 3 Acupressure Needles.
- 1 Metal Bougie.
- 2 Silver Catheters.
- 1 Mahogany Case, brass bound, lined with oil-dyed patent velvet.
- 1 Patent-leather Cover, water-proof.

Mott's General Operating Set.

\$72.85.

- 1 Mott's Knife, large.
- 1 Mott's Knife, medium.
- 1 Small Catling.
- 1 Capital Saw. 1 Metacarpal Saw.
- 1 Tourniquet. 1 Tenaculum.
- 1 pair Artery Forceps, plain.
- 1 pair Artery Forceps, spring-catch, plain.
- 1 Tiemann & Co.'s Bullet Forceps.

- 1 Liston's Bone Forceps.
- 12 Needles, Silk, Wax, Plastic Pins.
- 1 Galt's Trephine and Handle.
- 1 Trepanning Elevator and Raspatory.
- 1 Tenotome.
- 1 Curved Bistoury, sharp-point.
- 1 Curved Bistoury, probe-point.
- 1 Steel Director. 1 pair Polypus Forceps.
- 2 Silver Probes. 1 pair Scissors, straight.
- 1 pair Scissors, angular curve.
- 2 Mott's Retractors. 1 Double Hook.
- 1 Finger Knife. 1 Hey's Saw.
- 3 Scalpels. 1 Trocar and Canula.
- 1 Rosewood Case, lined with oil-dyed velvet.

J. W. Wright's General Operating Set.

\$140.

- In Tiemann & Co.'s Patent Folding Rosewood Case, compact, lined with oil-dyed silk velvet.
- 1 Amputating Knife, medium.
- 1 Satterlee's Amputating Saw.
- 1 Bistoury, sharp-point. 1 Straight Finger Knife.
- 1 Bistoury, probe-point. 1 Cooper's Hernia Bistoury.
- 2 Scalpels, large and small.
- 2 Tenotomes, straight, sharp and blunt-point.
- 1 Tenaculum.
- 1 set Mott's Aneurism Needles.
- 1 Straight Scissors, large.
- 1 Coxeter's Thumb Forceps.
- 1 Fenestrated Artery Forceps, spring-catch.
- 3 Wright's Artery Compressing Forceps.
- 1 Grooved Director and Tongue-Tie.
- 1 Galt's Trephine. 1 Wright's Bone Trephine.
- 1 Curved Rongeur. 1 Elevator and Raspatory.
- 2 Silver Probes. 1 Liston's Bone Forceps.
- 1 Ferguson's Sequestrum Forceps.
- 1 Detmold's Metacarpal Saw, narrow blade.
- 1 Tiemann's Bullet Forceps (American).
- 1 nest (4) Trocars, silver canulas.
- 1 Double-end Bone Scoop, all metal.
- 1 Little's Bone Chisel, to use with hand or mallet.
- 1 Little's Bone Gouge, to use with hand or mallet.
- 2 Szymanowsky's Bone Gouges.
- 1 set Brainard's Drills, short.
- 1 Prostatic Catheter, No. 10, Plated.
- 1 Tiemann's Tourniquet.
- 2 Hard Rubber Trachea Tubes.
- 1 Curved Polypus Forceps.
- 1 pair Parker's Retractors.
- 1 Russian Needle Forceps, small.
- 1 Vulcellum Forceps, long.
- 1 Henry's Circumcision Clamp.
- 1 Levis' Hernia Director.
- Needles, Silk, Silver Wire, Plastic Pins, &c.

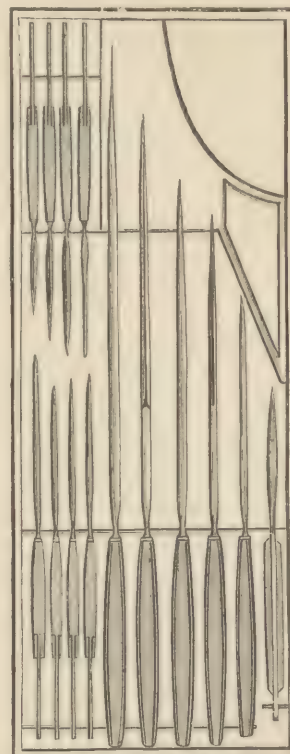
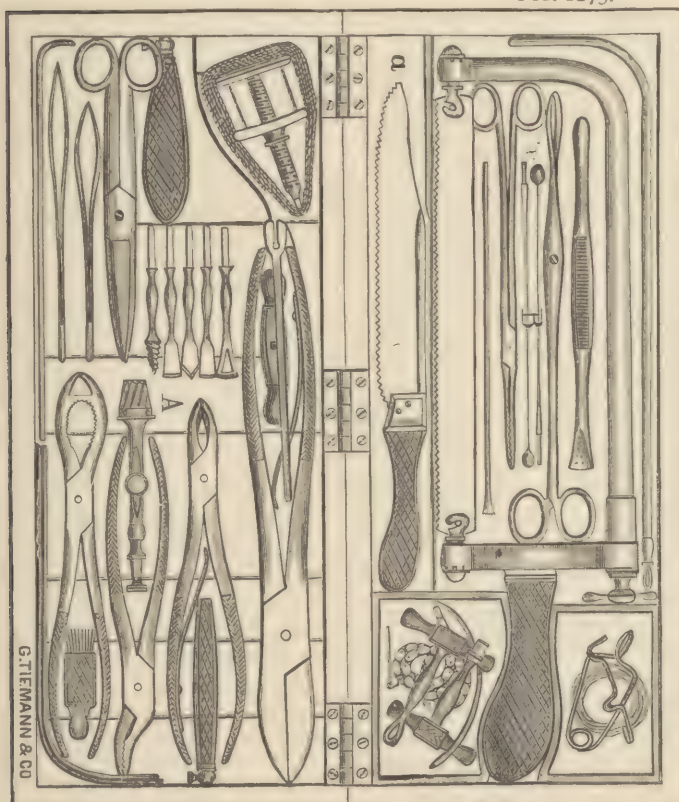
MILITARY SURGERY.

Otis' U. S. A. Compact Field Set.

\$160.

- 1 Strong Cartilage Knife.
- 1 Small Amputating Knife.
- 1 Catling, medium.
- 1 Amputating Knife, medium.
- 1 Catling, large.
- 1 Major Amputating Knife.
- 1 Bistoury, straight, sharp-pointed.
- 1 Bistoury, curved, sharp-pointed.
- 1 Bistoury, curved, probe-pointed.
- 1 Bistoury, long, straight, probe-pointed.
- 1 Tenaculum.
- 1 Scalpel, large.
- 1 Small and 1 very small Knife for Dissections.
- 1 Hey's Saw.
- 1 Torsion Forceps.
- 1 Needle Forceps.
- 1 Artery Needle Holder, with 4 points and 1 key.
- 1 Tourniquet.
- 1 Liston's Bone Forceps, large.
- 1 Rongeur.
- 1 Sequestrum Forceps.
- 1 Lion Forceps.
- 1 Conical Trephine.
- 1 Trephine Brush.
- 2 Retractors, German silver.
- 1 Osteotome, handle with 4 points.
- 1 Tirefond.
- 1 Oliver's Curved Osteotome and Chain-saw Conductor.
- 1 Scissors.
- 1 Dissecting Forceps.
- 1 Artery Forceps.
- 1 Silver Grooved Director.
- 1 Major Saw, with two extra narrower blades.
- 1 Movable Back Saw.
- 1 English No. 6 Gum-elastic Catheter.
- 1 Elevator.
- 1 Bullet Forceps (Gross').
- 1 Tiemann & Co.'s Bullet Forceps.
- 1 Long Articulated Probe, or *sonde de poitrine*, with 2 Nelaton or porcelain tips.
- 1 Burrheaded Ball-searcher.
- 1 Chain Saw, rotating handles and needle.
- 10 Large Serrefines.
- 2 coils of Annealed Iron Wire under the Movable Back-saw, Silk, Linen and Catgut Ligatures, Wax, Silver Suture Wire, Surgeons' Curved Needles, Acupressure Pins.
- 2 Silver Probes.
- 1 Mahogany Brass-bound Case, lined with oil-dyed velvet.

FIG. 1273.



MILITARY SURGERY.

U. S. A. Staff Surgeons' Capital Operating Set.

\$137.10.

- 1 Amputating Knife, long.
- 1 Amputating Knife, medium.
- 1 Catling, long.
- 1 Catling, small.
- 1 Cartilage Knife, heavy, ebony handle.
- 1 Straight Bistoury.
- 3 Scalpels.
- 1 Bow Saw, two blades.
- 1 Chain Saw, best.
- 1 Metacarpal Saw, lifting back.
- 1 Hey's Saw.
- 2 Trephines and Handle.
- 1 Razor.
- 1 Raspatory, ebony handle.
- 1 Elevator, strong.
- 1 Brush.
- 1 pair Liston's Bone Forceps, 9 inches long.
- 1 Rongeur, curved, with spring.
- 1 Rongeur, straight, with spring.
- 1 pair Sequestrum Forceps.
- 1 pair Lithotomy Forceps.
- 1 pair Liston's Artery Forceps, slide-catch.
- 1 set Mott's Artery Needles.
- 12 Surgeon's and 6 Wire Needles.
- 1 Tourniquet. 1 Tenaculum.
- 1 pair Scissors.
- 1 Chisel and one Gouge, ebony handles.
- 1 Trocar and Canula, straight.
- 1 set Brainard's Bone Drills.
- 1 pair Mott's Retractors.
- 12 yards Silver Wire.
- 1 Mahogany Case, lined with red chamois.
- 1 Leather Pouch, heavy.

U. S. A. Capital Operating Set.

\$102.50.

- 1 Amputating Knife, long.
- 1 Amputating Knife, medium.
- 1 Catling, long. 1 Catling, small.
- 1 Cartilage Knife, heavy, ebony handle.
- 1 Bow Saw, two blades.
- 1 Metacarpal Saw. 1 Chain Saw, best.
- 1 Hey's Saw.
- 1 Galt's Trephine. 1 Crown Trephine.
- 1 Trephine Handle.
- 1 pair Liston's Bone Forceps, with spring.
- 1 pair Liston's Bone Forceps, slightly curved.
- 1 pair Gouge Forceps or Rongeur.
- 1 pair Sequestrum Forceps.
- 1 pair Artery Forceps, plain.
- 1 set Mott's Aneurism Needles.

12 Surgeon's Needles.

- 1 Tourniquet.
- 1 Tenaculum.
- 1 pair Scissors, straight, heavy.
- 1 Chisel and 1 Gouge.
- 1 Lead Mallet.
- 1 set Brainard's Bone Drills.
- 1 pair Mott's Retractors.
- 1 Elevator and Raspatory.
- 1 Brush, 12 yards Iron Wire, Silk, Plastic Pins.
- 1 Mahogany Case, lined with oil-dyed velvet or chamois.
- 1 Leather Pouch.

U. S. A. Staff Surgeons' Minor Operating Set. Regulation Style of October, 1867.

\$136.

- 1 Amputating Knife.
- 1 Long Finger Knife.
- 1 Hernia Knife.
- 1 Straight Sharp-pointed Bistoury.
- 1 Curved Sharp-pointed Bistoury.
- 1 Curved Probe-pointed Bistoury.
- 2 Scalpels, large and small.
- 1 pair Slide-catch Artery Forceps.
- 1 pair Tiemann & Co.'s Bullet Forceps.
- 1 pair Dressing Forceps.
- 1 pair Coxeter's Dissecting Forceps, small.
- 1 pair (Esophageal) Forceps, French joint.
- 1 set Mott's Aneurism Needles.
- 12 Surgeon's and 6 Wire Suture Needles.
- 1 pair Straight Scissors, French joint.
- 1 pair Angular Scissors, French joint.
- 1 pair Scissors, curved on the flat, French joint.
- 1 Tenaculum.
- 1 Rectum Trocar and Canula.
- 2 Double Trachea Tubes, sterling silver.
- 1 Belocq's Canula for Epistaxis, sterling silver.
- 1 Nelaton's Bullet Probe.
- 1 Director and Porte Mèche.
- 1 pair Flat and Cutting Pliers.
- 1 Wire Ecraseur, with two points.
- 2 Grooved Staffs. 1 Syme's Staff.
- 1 Plain Sound.
- 6 Silver-plated, Double-curved Bougies.
- 3 Silver Catheters.
- 3 Gum Elastic Catheters, English.
- 1 Prostate Gland Catheter, sterling silver.
- 6 Serrefines.
- 24 Suture Pins. 6 yards Silver Sutures.
- 1 (Esophageal) Probang, silver crochet.
- 1 Tonsilotome.
- 1 pair Trouseau's Tracheal Forceps.
- 1 Mahogany Case, brass-bound.
- 1 Leather Pouch.

MAJOR SURGERY.

Tiemann & Co.'s

No. 1 Set of Amputating Instruments.

\$25.

- 1 Liston's Knife, Hip and Thigh.
- 1 Liston's Knife, Leg and Arm.
- 1 Catling, small, Hand and Foot.
- 1 Scalpel. 1 Tenaculum.
- 1 pair Artery Forceps.
- 1 Metacarpal Saw. 1 Capital Saw.
- 1 Tourniquet.
- 12 Needles, Silk, Wax and Plastic Pins.
- 1 pair Bone Forceps.
- 1 Mahogany Case, lined with oil-dyed velvet.

Tiemann & Co.'s

No. 2 Set of Amputating Instruments.

\$30.

- 1 Liston's long Knife, Hip and Thigh.
- 1 Liston's medium Knife, Leg and Arm.
- 1 Catling.
- 1 Scalpel, checkered handle.
- 1 Tenaculum.
- 1 Metacarpal Saw. 1 Capital Saw.
- 1 pair Spring-catch Artery Forceps, fenestrated.
- 1 Tourniquet.
- 12 Needles, Silk, Wax and Plastic Pins.
- 1 pair Liston's Bone Forceps.
- 1 Mahogany Case, lined with oil-dyed velvet.

Tiemann & Co.'s

No. 3 Set of Amputating Instruments.

\$35.

- 1 Liston's long Knife, Hip and Thigh.
- 1 Liston's medium Knife, Leg and Arm.
- 1 Catling, medium. 1 Scalpel, feruled.
- 1 Tenaculum, feruled. 1 Capital Saw.
- 1 Metacarpal Saw, lifting back.
- 1 pair Slide-catch Artery Forceps, fenestrated.
- 1 Tourniquet.
- 12 Needles, Silk, Wax and Plastic Pins.
- 1 pair Liston's Bone Forceps, best.
- 1 fine Rosewood Case, lined with oil-dyed velvet.

Tiemann & Co.'s Compact Amputating Set.

\$33.50.

- 1 Parker's Knife.
- 1 Catling, medium size.
- 1 Finger Knife, French.

- 1 Scalpel.
- 1 Tenaculum.
- 1 Amputating Saw, lifting back.
- 1 Metacarpal Saw.
- 1 Liston's Bone Forceps, best.
- 1 pair of Fenestrated Spring-catch Artery Forceps.
- 1 Tourniquet.
- 12 Needles, Silk, Wax, Plastic Pins.
- 1 Rosewood Case, lined with oil-dyed velvet.

Tiemann & Co.'s

Amputating and Trepanning Set.

\$44.25.

- 1 Liston's long Knife, Hip and Thigh.
- 1 Liston's medium Knife, Leg and Arm.
- 1 Catling, Foot and Hand.
- 1 Tenaculum.
- 1 Scalpel.
- 1 Elevator and Raspatory.
- 1 Hey's Saw. 1 Brush.
- 1 Metacarpal Saw. 1 Capital Saw.
- 1 Galt's Conical Trephine and Handle.
- 1 pair Spring-catch Fenestrated Artery Forceps.
- 1 Tourniquet.
- 1 pair Liston's Bone Forceps.
- 12 Needles, Silk, Wax, Plastic Pins.
- 1 Mahogany or Rosewood Case, lined with oil-dyed velvet.

Capital Operating Set.

\$52.

- 1 Capital Saw.
- 1 Liston's long Knife or Catling, Hip and Thigh.
- 1 Liston's medium Knife or Catling, Leg and Arm.
- 1 Short Catling or Breast Knife.
- 1 Scalpel, checkered handle.
- 1 Tenaculum.
- 1 pair Fenestrated spring-catch Artery Forceps.
- 1 pair Liston's Bone Forceps.
- 1 Elevator with Raspatory.
- 1 Brush.
- 1 Hey's Saw.
- 1 Galt's Conical Trephine and Handle.
- 1 Tourniquet.
- 12 Needles, Silk, Wax, Plastic Pins.
- 2 Small Scalpels.
- 1 Bistoury, sharp-pointed.
- 1 Bistoury, probe-pointed.
- 1 Bistoury, Finger. 1 Tenotome.
- 1 Trocar and Canula. 1 Aneurism Needle.
- 1 Mahogany Case, lined with oil-dyed velvet.

MAJOR AND MINOR SURGERY.

Conant's Capital and Minor Operating Set.

\$53.95.

- 1 Amputating Knife, long.
- 1 Amputating Knife, small.
- 1 Amputating Saw, small.
- 1 Handle, to fit the above.
- 1 pair Satterlee's Bone Forceps, small.
- 1 Double Hook.
- 1 Bistoury, probe-pointed. 1 Hernia Knife.
- 1 Bistoury, sharp-pointed. 2 Scalpels, assorted.
- 1 Tenotome. 2 Parker's Retractors.
- 1 Nelaton's Bullet Probe. 1 Director, steel.
- 1 pair Scissors, straight. 1 Caustic Holder.
- 1 pair Scissors, curved on the flat.
- 1 pair Tiemann & Co.'s Bullet Forceps.
- 1 pair Polypus Forceps, curved, small.
- 1 Compound Catheter, Male and Female, German silver.
- 2 Silver Probes.
- 12 Needles, Silk, Wax, Plastic Pins.
- 1 pair Artery Forceps, spring-catch, fenestrated.
- 1 Tourniquet.
- 1 Rosewood Case, lined with oil-dyed velvet.

Little's Minor Operating Set.

Instruments with Hard-rubber Handles, in highly finished Hard-rubber Case, \$40.
Ivory Handle Instruments, \$45.

- 3 Scalpels, assorted sizes.
- 1 Finger Knife.
- 1 Curved Bistoury, probe-pointed.
- 1 Curved Bistoury, sharp-pointed.
- 1 Hernia Knife.
- 1 Tenaculum.
- 1 Aneurism Needle.
- 2 Retractors.
- 1 Phelps' Artery Forceps.
- 1 Thumb (Dressing) Forceps.
- 1 Trocar and Silver Canula. 1 Director.
- 1 Peters' Hernia Director.
- 1 Scissors, angular.
- 1 Curved Rongeur and Pin Cutter.
- 2 Silver Probes.
- 6 Needles and Silk.

Mason's Minor Operating Set.

\$44.

- 1 Metacarpal Saw.
- 4 Bistouries.
- 4 Scalpels.
- 1 Tenotome.

- 1 Tenaculum.
- 1 set Fletcher's Aneurism Needles.
- 1 pair Straight Scissors.
- 1 pair Angular Scissors.
- 1 pair Dressing Forceps.
- 1 pair Fine Thumb Forceps.
- 1 pair Fenestrated Artery Forceps.
- 1 pair Prout's Needle Forceps.
- 1 Hydrocele Trocar.
- 1 Exploring Trocar.
- 1 German-silver Director.
- 1 pair Silver Probes.
- Needles, Silk, Silver Wire.
- 1 Mahogany or Rosewood Case, lined with oil-dyed silk velvet.

Seneca D. Powell's Operating Case.

\$85.

- 3 Scalpels.
- 1 Curved Bistoury, sharp-pointed.
- 1 Curved Bistoury, probe-pointed.
- 1 Straight Bistoury.
- 1 Cooper's Hernia Knife.
- 1 Tenotome.
- 1 Aneurism Needle.
- 1 Tenaculum.
- 1 Director, silver.
- 1 Peters' Hernia Director.
- 2 Retractors.
- 1 Angular Scissors.
- 1 Flat-curved Scissors.
- 1 Straight Scissors.
- 1 Dressing Forceps.
- 1 Artery Forceps, fenestrated.
- 1 Phelps' Torsion Forceps.
- 2 Silver Probes.
- 1 Nelaton's Probe, 3 pieces.
- 1 Rongeur and Pin-Cutter.
- 1 Van Buren's Sequestrum Forceps.
- 1 Hebras' Bone Scoop.
- 1 Thumb Forceps.
- 1 Sands' Needle Forceps.
- 1 Trocar and Silver Canula.
- 1 Ashton's Ligature Carrier.
- 1 Galt's Trepphine.
- 1 Bone Elevator.
- 1 Post's Pile Forceps.
- 1 Powell's Phymosis Forceps.
- 1 Trousseau's Trachea Dilator.
- 1 Sayre's Periosteotome.
- 1 Buck's Pin Conductor.
- 1 Exploring Needle.
- 1 Detmold's Metacarpal Saw.
- 1 Rosewood Case, lined with oil-dyed silk velvet.

MINOR SURGERY.

Plain Minor Operating Set.

\$18.

- 1 Straight Finger Knife.
- 1 Curved Probe-pointed Bistoury.
- 1 Curved Sharp-pointed Bistoury.
- 1 Cooper's Hernia Knife.
- 3 Scalpels, assorted. 1 Tenotome.
- 1 Aneurism Needle. 1 Tenaculum.
- 6 Needles, Silk, Iron Wire and Plastic Pins.
- 1 pair Straight Scissors.
- 1 pair Dressing Forceps.
- 1 pair Plain Artery Forceps.
- 1 Steel Director.
- 1 Rosewood Case, lined with oil-dyed velvet.

Tiemann's Minor Operating Set.

\$25.

- 1 Straight Finger Knife.
- 1 Curved Probe-pointed Bistoury.
- 1 Curved Sharp-pointed Bistoury.
- 1 Cooper's Hernia Knife.
- 3 Scalpels, assorted. 1 Tenotome.
- 1 Aneurism Needle. 1 Tenaculum.
- 6 Needles, Silk, Iron Wire and Plastic Pins.
- 1 pair Straight Scissors.
- 1 pair Dressing Forceps.
- 1 pair Plain Artery Forceps.
- 1 Steel Director.
- 1 Compound Catheter, male and female, plated.
- 1 pair Spring-catch Artery Forceps, fenestrated.
- 2 Silver Probes.
- 1 Hard-rubber Caustic Holder.
- 1 Rosewood Case, lined with oil-dyed velvet.

Eves' Minor Operating Set.

\$33.50.

- 1 Double Hook.
- 1 Curved Sharp-pointed Bistoury.
- 1 Curved Probe-pointed Bistoury.
- 1 Cooper's Hernia Knife.
- 4 Scalpels, assorted. 1 Tenotome.
- 1 Tenaculum. 1 Aneurism Needle.
- 1 Narrow Metacarpal Saw.
- 1 pair Plain Artery Forceps.
- 1 Small Trocar. 1 pair Angular Scissors.
- 1 pair Polypus Forceps.
- 1 pair Slide-catch Torsion Forceps.
- 6 Needles, Silk and Silver Wire.
- 1 Steel Director. 2 Silver Probes.
- 1 Rosewood Case, lined with oil-dyed velvet.

Enos' Minor Operating Set.

\$33.

- 1 Double Hook.
- 1 Curved Sharp-pointed Bistoury.
- 1 Curved Probe-pointed Bistoury.
- 1 Cooper's Hernia Knife.
- 4 Scalpels, assorted. 1 pair Small Polypus Forceps.
- 1 Tenotome. 1 Tenaculum.
- 1 Aneurism Needle 1 Narrow Metacarpal Saw.
- 1 Small Trocar. 1 pair Plain Artery Forceps.
- 1 pair Angular-curved Scissors.
- 1 pair Slide-catch Artery Forceps.
- 6 Needles, Silk, Iron and Silver Wire.
- 1 Steel Director.
- 2 Silver Probes.
- 1 Rosewood Case, lined with oil-dyed velvet.

Hospital Minor Operating Set.

\$74.80.

- 2 Finger Knives.
- 2 Straight Probe-pointed Bistouries.
- 1 Straight Hernia Knife.
- 2 Curved Sharp-pointed Bistouries.
- 2 Curved Probe-pointed Bistouries.
- 1 Curved Hernia Knife.
- 1 Abscess Knife. 1 Short Straight Bistoury.
- 1 Tenaculum. 4 Tenotomes, various shapes.
- 1 pair Nichol's Needle Forceps.
- 1 pair Parker's Retractors.
- 18 Assorted Needles, Silk, Silver Wire.
- 12 yards Annealed Iron Wire.
- 3 Serrefines.
- 1 Straight and 1 Curved Tonsil Knife.
- 7 Scalpels, assorted sizes and shapes.
- 1 Green's Double Hook, plain.
- 1 pair Spring-catch Fenestrated Artery Forceps.
- 1 pair Coxeter's Plain Artery Forceps, small.
- 1 pair Strabismus Forceps.
- 1 pair Tiemann & Co.'s Bullet Forceps.
- 1 Whalebone Bullet Probe.
- 1 Nelaton's Bullet Probe.
- 1 pair Polypus Forceps.
- 1 pair Vulsellum Forceps.
- 1 pair Straight Heavy Scissors.
- 1 pair Scissors, curved on the flat.
- 1 pair Scissors, angular curve.
- 1 Trocar and Canula.
- 1 German-silver Ear Speculum.
- 1 Belocq's Sound, for epistaxis, sterling silver.
- 1 Steel Director.
- 1 Rosewood Case, brass-bound, and lined with oil-dyed velvet.

POCKET CASES.

Two-fold Pocket Set.

\$10.

Two-fold Morocco Case, single-bladed Instruments,
with Tortoise-shell Handles; containing:

- | | |
|--|---------------------------|
| 1 Scalpel. | 1 Probe-pointed Bistoury. |
| 1 Tenaculum. | 1 pair Straight Scissors. |
| 1 pair Artery Forceps. | 1 Spatula. |
| 1 Compound (male and female) Catheter. | |
| 1 Director. | |
| 1 pair Silver Probes. | |
| 6 Needles and Silk. | |

Two-fold Pocket Set.

\$12.

Two-fold Morocco Case, Single-bladed Instruments,
with Tortoise-shell Handles, containing:

- | | |
|--|---------------------------|
| 1 Scalpel. | 1 Probe-pointed Bistoury. |
| 1 Tenaculum. | 1 pair Straight Scissors. |
| 1 pair Artery Forceps. | 1 pair Dressing Forceps. |
| 1 Hard Rubber and Silver Caustic Case. | |
| 1 Compound (male and female) Catheter. | |
| 1 Director. | |
| 1 pair Silver Probes. | |
| 6 Needles and Silk. | |

Three-fold Pocket Set.

\$15.

Three-fold Morocco Case, Single-bladed Instruments,
with Tortoise-shell Handles; containing:

- | | |
|--|---------------------------|
| 1 Scalpel. | 1 Probe-pointed Bistoury. |
| 1 Tenaculum. | 1 pair Straight Scissors. |
| 1 pair Artery Forceps. | 1 pair Dressing Forceps. |
| 1 Spatula. | 1 Sharp-pointed Bistoury. |
| 1 Hard Rubber and Silver Caustic Case. | |
| 1 Gum Lancet. | |
| 1 Compound (male and female) Catheter. | |
| 1 Director. | |
| 1 pair Silver Probes. | |
| 6 Needles and Silk. | |

Four-fold Pocket Case.

\$21.

Leather Case. Contents:

- | |
|-----------------------------|
| 1 Male and Female Catheter. |
| 1 Tenaculum. |
| 1 Hard-rubber Caustic Case. |
| 2 Silver Probes. |

- | | |
|----------------------------------|---------------------------|
| 1 Exploring Needle. | |
| 1 Director and Aneurism Needle. | |
| 1 Probe-pointed Bistoury. | |
| 1 pair Dressing Polypus Forceps. | |
| 1 Scalpel. | 1 Sharp-pointed Bistoury. |
| 1 pair Straight Scissors. | 1 pair Curved Scissors. |
| 1 Thumb Lancet. | 1 Spatula. |
| 1 pair Dissecting Forceps. | |
| 1 Straight Finger Bistoury. | |
| 1 Seton Needle. | |
| 6 Needles and Ligature Silk. | |

The Instruments have Tortoise-shell Handles and are single bladed.

Same contents, all of extra fine finish, spring or slide catch, Catheters and Probes of sterling silver, neat Turkey-Morocco Case, silver lock.....\$36.

Hospital Pocket Set.

\$18.

Three-fold Russia-leather or Morocco Case, single-bladed Instruments, with Tortoise-shell Handles, containing:

- | |
|----------------------------------|
| 1 Sharp-pointed Bistoury. |
| 1 Probe-pointed Bistoury. |
| 1 Scalpel. |
| 1 Tenaculum. |
| 1 Abscess Lancet. |
| 1 Compound Catheter. |
| 1 pair Straight Scissors. |
| 1 pair Angular Scissors. |
| 1 pair Dressing Polypus Forceps. |
| 1 pair Plain Artery Forceps. |
| 1 Spatula. |
| 1 Steel Director. |
| 2 Silver Probes. |
| 6 Needles and Ligature Silk. |

Sayre's Pocket Set.

\$23.50.

Two-fold morocco Case.

- | | |
|---|------------------------------|
| 1 Sharp and 1 Blunt-pointed Tenotome. | |
| 1 Tenaculum and Sharp-pointed Bistoury. | |
| 1 Scalpel and Probe-pointed Bistoury. | |
| 1 Finger Knife. | 1 pair Plain Artery Forceps. |
| 1 pair Straight Scissors. | 1 Director and Tongue-tie. |
| 1 pair Silver Probes. | |
| 1 Compound Catheter, silver. | |
| 1 Silver Caustic Case, seamless. | |
| 6 Needles, Silk and Wax. | |

POCKET CASES.

Little's Pocket Set.

\$25.

Instruments slide catch, Tortoise-shell Handles, enclosed in fine morocco Case, lined with silk-velvet.

- 1 Scalpel and Sharp-pointed Bistoury.
- 1 Tenaculum and Probe-pointed Bistoury.
- 1 Gum Lancet and Tenotome.
- 1 Hernia Bistoury and Finger Knife.
- 1 pair Angular Scissors.
- 1 pair Polypus Dressing Forceps.
- 1 pair Fine Thumb Forceps.
- 1 Weir's Vaccinating Lancet.
- 1 Exploring Needle.
- 1 Spatula and Tongue-tie.
- 1 Director and Aneurism Needle.
- 1 Parker's Silver Catheter and Caustic Case.
- 2 Silver Probes.
- 6 Needles, Silk and Wax.

With Thermometer, \$28.

Weir's Pocket Set.

\$30.

Either two or three-fold morocco Case.

- 1 Aneurism Needle and Sharp-pointed Bistoury.
- 1 Gum Lancet and Probe-pointed Bistoury.
- 1 Hernia Knife and Tenaculum.
- 1 Thermometer in silver Case.
- 1 Tenotome and Scalpel. 1 pair Scissors.
- 1 Director. 2 Probes.
- 1 pair Thumb Forceps. 1 pair Dressing Forceps.
- 1 Weir's Vaccinating Lancet.
- 1 Silver Female Catheter and Caustic Holder.
- 1 Stimson's Hypodermic Syringe.
- 6 Needles, Silk, Wax, Wire.

Van Buren's Pocket Set.

\$22.

Turkey morocco Case, silk-velvet lining, silver lock. Instruments double-bladed, Tortoise-shell Handles with slide or spring-catch ; contents :

- 1 Sharp-pointed Bistoury and Tenotome.
- 1 Scalpel and Probe-pointed Bistoury.
- 1 Gum Lancet and Tenaculum.
- 1 pair Straight Scissors.
- 1 pair Bull-dog Artery Forceps.
- 1 Steel Director. 2 Silver Probes.
- 1 Silver Catheter (male and female) of sterling silver and Caustic Case, sterling silver, *seamless*.
- 6 Needles and Ligature Silk.

Andrews' Pocket Case.

\$28.

Black hard rubber Case, with nickel-plated mountings, the instruments placed on metallic rests, so as to dispense with velvet lining.

- 1 Scalpel.
- 1 Curved Sharp-pointed Bistoury.
- 1 Curved Blunt-pointed Bistoury.
- 1 Tenotome.
- 1 Tenaculum.
- 1 Grooved Exploring Needle.
- 1 Abscess Lancet.
- 1 pair Scissors.
- 1 pair Dressing Forceps.
- 1 pair Artery Forceps, toothed.
- 1 pair Andrews' Toothed Bull-dog Forceps.
- 1 Combined Catheter.
- 1 Andrews' Pocket-Case Saw.
- 1 Ivory Card for Ligature.
- 1 Grooved Director.
- 1 Probe.
- 6 Needles, kept in a little compartment with a metallic, nickeled lid.

The first seven instruments each in a thin ivory handle, the length not to exceed 5 inches, these are set up edgewise in the Case.

Parker's Pocket Set.

\$18.

Two-fold Morocco Case, plain double-bladed Instruments, with Tortoise-shell Handles ; containing :

- 1 Scalpel and Probe-pointed Bistoury.
- 1 Tenotome and Sharp-pointed Bistoury.
- 1 Tenaculum and Gum Lancet.
- 1 pair Dressing Forceps. 1 pair Artery Forceps.
- 1 pair Scissors. 1 Lancet.
- 2 Silver Probes. 1 Steel Spatula.
- 1 Steel Director.
- 1 Plated Compound Catheter and Caustic-holder.
- 6 Needles and Silk.

Parker's Fine Pocket Set.

\$25.

Contents the same as in the one previous, but Tortoise-shell Handle Instruments, either slide or spring-catch, extra fine finished, the Compound Catheter (male and female) is made of sterling silver, the Caustic-holder *seamless*, will last much longer than a soldered one. The Case is made of genuine Turkey morocco, with a silver lock, very neat and compact.

POCKET CASES.

Multum in Parvo Pocket Set.

\$19.

Turkey morocco Case, silk-velvet lining, silver lock.
Instruments Tortoise-shell Handles with spring or
slide-catch, double-bladed; containing:

- 1 Scalpel and Probe-pointed Bistoury.
- 1 Sharp-pointed Bistoury and Tenotome.
- 1 Gum Lancet and Tenaculum.
- 1 pair Straight Scissors.
- 1 pair Fenestrated Spring-catch Artery Forceps.
- 1 Female Catheter and Caustic Case, sterling silver.
- 1 Steel Director. 2 Silver Probes.
- 6 Needles and Silk.

Gunn's Pocket Set.

\$20.

Turkey morocco Case, silk-velvet lining, silver lock.
Instruments double-bladed, Tortoise-shell Handles
with slide or spring-catch; contents:

- 1 Scalpel and Exploring Needle.
- 1 Sharp-pointed Bistoury and Tenotome.
- 1 Probe-pointed Bistoury and Scalpel.
- 1 Seton Needle.
- 1 Tenaculum. 1 pair Scissors.
- 1 Screw Probe Director.
- 1 pair Torsion Forceps with slide-catch and a long
groove, answers also for holding Suture Needles.
- 4 Suture Needles.
- 1 Sharp and 2 Blunt Aneurism Needles.
- 1 skein Ligature Silk.

Hamilton's Pocket Set.

\$32.

Turkey morocco Case, lined with silk-velvet, silver lock.
Instruments double-bladed, Tortoise-shell Handles
with spring-catch; contents:

- 1 Large Scalpel and Exploring Needle.
- 1 Medium and 1 Small Scalpel.
- 1 Tenaculum and Aneurism Needle.
- 1 Sharp and 1 Blunt-pointed Tenotome.
- 1 Metacarpal Saw.
- 1 pair Bull-dog Artery Forceps with spring-catch.
- 1 pair Slide-catch Torsion Forceps.
- 1 pair Straight Scissors. 1 Thumb Lancet.
- 1 set Silver Probes and Nelaton's Bullet Probe.
- 1 Male and Female Catheter and Caustic Holder of
Sterling Silver.
- 6 Needles and Ligature Silk.

The same, without the Catheter and Caustic Case...\$27.

J. R. Wood's Pocket Set.

\$27.50.

Morocco Case lined with silk-velvet. Instruments double
bladed, Tortoise-shell Handles with spring or slide
catches; contents:

- 1 Scalpel and Gum Lancet.
- 1 Scalpel and Tenotome.
- 1 Sharp and 1 Probe-pointed Bistoury.
- 1 Aneurism and 1 Exploring Needle.
- 1 Compound Male and Female Catheter and Caustic
Case.
- 1 pair Straight Scissors.
- 1 pair of Dressing Polypus Forceps.
- 1 pair Hamilton's Artery Forceps.
- 1 pair Plain Artery Forceps.
- 1 Grooved Silver Probe and Nelaton's Porcelain Head,
in three parts united by screw.
- 1 Lancet.
- 2 Plain Silver Probes.
- 1 Coil Silver Suture Wire.
- 6 Needles and Ligature Silk.

Gross's Pocket Set.

\$22.

Russia-leather or morocco Case, German silver lock.
Instruments double and single-bladed, Tortoise-
shell Handles with slide or spring-catch; contents:

- 1 pair Mouse-teeth Artery Forceps, delicate.
- 1 Scalpel.
- 1 pair Dressing Polypus Forceps.
- 1 Probe-pointed Bistoury and Tenaculum.
- 1 Sharp-pointed Bistoury and Tenotome.
- 1 pair Straight Scissors.
- 1 Finger Bistoury.
- 1 Caustic-holder, plated.
- 1 pair Vulsellum Forceps. 1 Exploring Needle.
- 1 Gross' Ear Spoon. 1 Steel Director.
- 6 Needles and Ligature Silk.
- 2 Silver Probes.
- 1 Male and Female Catheter.

Gross's Fine Pocket Set.

\$26.

Two-fold Turkey morocco Case, lined with silk-velvet,
silver lock. Contents the same as in the one previ-
ous. The Caustic Case is made of sterling silver,
seamless, lasting much longer than a soldered one.
The Male and Female Catheter are of sterling silver
and the whole of extra fine finish and quality.

POCKET CASES.

Wight's Pocket Set.

\$37.

Two-fold Frame Case.

- 1 Scalpel and Finger Knife.
- 1 Tenotome and Sharp-pointed Bistoury
- 1 Scalpel and Probe-pointed Bistoury.
- 1 Tenaculum and Gum Lancet.
- 1 pair Wight's Artery Forceps.
- 1 pair Thumb Forceps.
- 1 Sand's Needle Holder. 1 Exploring Needle.
- 1 pair Straight Scissors. 1 pair Curved Scissors
- 1 Thermometer in Hard-rubber Case.
- 1 Parker's Catheter and Caustic Case.
- 1 Director and Aneurism Needle.
- 2 Silver Probes
- 1 Metacarpal Saw.
- 6 Needles, Silk, Wax.

Gay's Pocket Set.

\$22.

Morocco Case, four inches long by two wide, silver lock.

- 1 Tiemann & Co.'s Bent Thermometer.
- 1 Patent Hypodermic Syringe.
- 1 Scalpel and Probe-pointed Bistoury.
- 1 Gum Lancet and Tenotome.
- 1 Female Catheter and Caustic Case
- 1 Gay's Scissors, both rings open.
- 1 pair Artery Forceps, plain.
- 1 Spatula and Grooved Director Probe, steel.
- 1 Silver Director Probe.
- 1 Silver Probe.
- 6 Straight Needles, Silk, Wax.

Brown's Pocket Set.

\$30.

- 1 Amputating Knife, shell handle.
- 1 Scalpel and Newman's Needle.
- 1 Gum Lancet and Tenotome.
- 1 Probe and 1 Sharp-pointed Bistoury.
- 1 Brown's Subcutaneous Syringe.
- 1 Dressing Ear and Bullet Forceps.
- 1 Slide-catch Artery Forceps.
- 1 Combined Porte Caustique with Eye Curette.
- 1 Open Ring Scissors, rounded points.
- 1 Tiemann's Flexible Joint Catheter.
- 1 Aneurism Needle and Director.
- 2 Silver Probes.
- 1 Nelaton's Probe, porcelain head
- 1 Vaccinating Lancet.
- Ishiguro or Whale-tendon Ligature, Silk and Needles.

Exhibition Pocket Set, extra size.

\$100.

Five-fold Turkey morocco Case, with one inner and one outside silver lock; containing: Our patent-catch Instruments.

- 2 Large and 2 Small Tortoise-shell Patent-catch Handles.
- 1 Movable Back Saw and 1 Amputating Knife, both five inch blades.
- 1 Amputating Scalpel. 2 Assorted Scalpels.
- 1 Tenotome. 1 Gum Lancet.
- 1 Blunt-pointed Straight Bistoury.
- 1 Curved Probe-pointed Bistoury.
- 1 Curved Sharp-pointed Bistoury.
- 1 Post's Wire Needle.
- 1 Cataract Needle.
- 1 Cooper's Hernia Knife.
- 1 Tenaculum.
- 1 Exploring Lancet.
- 1 Aneurism Needle.
- 1 Belocq's Sound for Epistaxis (silver).
- 1 Silver Male and Female Catheter with Caustic Case.
- 1 Abscess Lancet. 1 Thumb Lancet.
- 1 Weir's Vaccinating Lancet. 1 Seton Needle.
- 1 pair Angular Scissors. 1 pair Straight Scissors.
- 1 Fenestrated Spring-catch Artery Forceps.
- 1 Torsion Forceps.
- 1 Prout's Needle Forceps, with slide-catch.
- 1 pair Polypus and Dressing Forceps, combined with Tiemann & Co.'s Bullet Extractor.
- Uterine, Oesophagus and Vulsellum Forceps.
- Ligature, Suture Needles, Plastic Pins, Silver and Iron Wire, Serrefines.
- 1 pair Fine Curved-up Scissors.
- 1 Thumb Forceps for extracting Splinters, &c.
- 1 Exploring Trocar.
- 1 Trocar for Hydrocele and Ascites.
- 1 set Silver Probes with Nelaton's Bullet Probe.
- 1 Director. 1 Porte Méche.
- 1 Whalebone Probe. 1 Artery Constrictor.
- 1 Ear Scoop and Hook to remove foreign bodies.
- 1 Spatula with Elevator.

Crosby's Pocket Set.

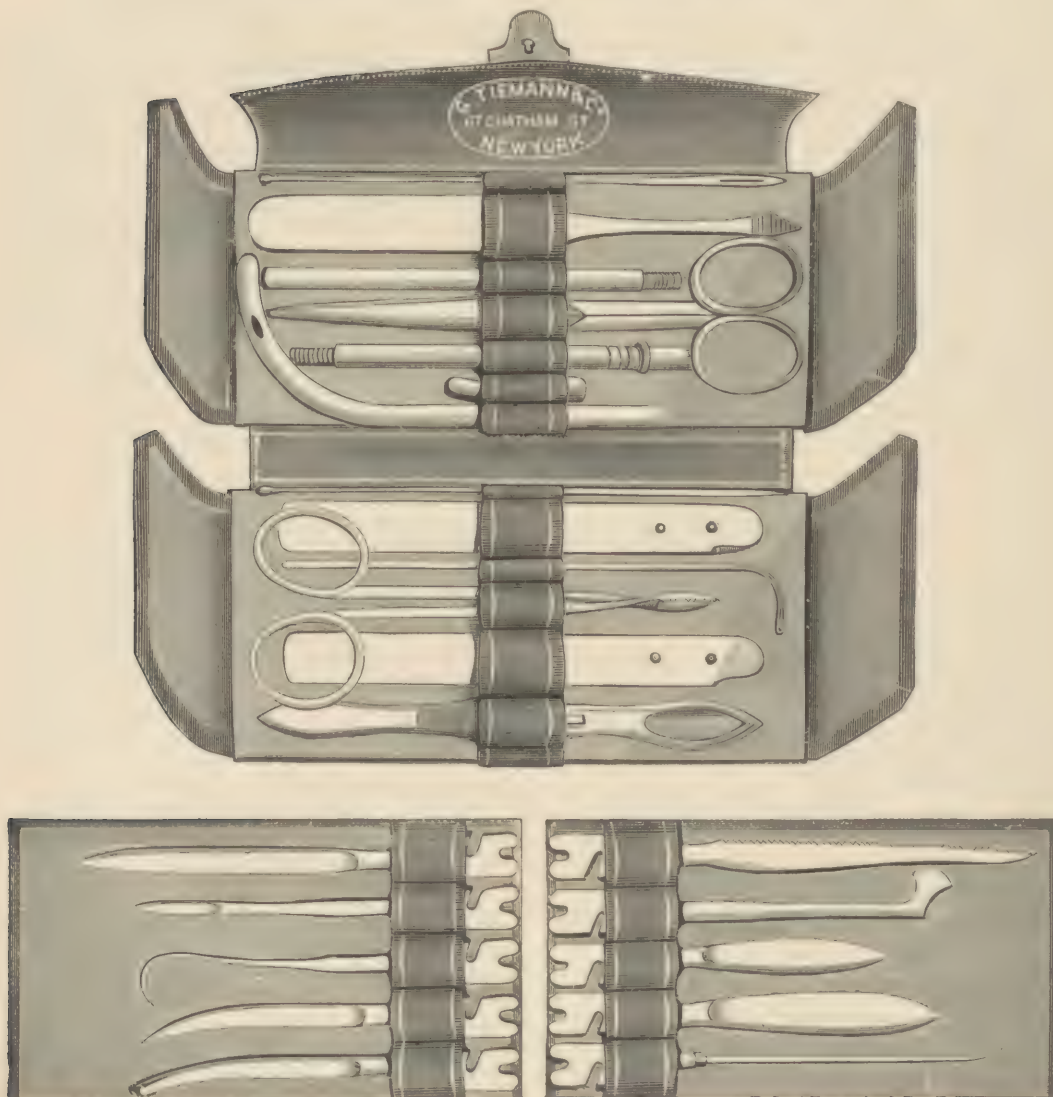
\$15.

One-fold morocco Case.

- 1 Scalpel and Probe-pointed Bistoury.
- 1 Tenotome and Sharp-pointed Bistoury.
- 1 Tenaculum and Exploring Needle.
- 1 pair Artery Forceps. 1 pair Scissors.
- 1 Director and Aneurism Needle.
- 2 Probes.
- 6 Needles, Silk, Wax.

POCKET CASES.

FIG. 1274.—Tiemann & Co.'s Patent Pocket Set. A.

**Tiemann & Co.'s Patent Catch Pocket Set.**

\$33.

This Pocket Set contains, in a very neat and compact Case of Turkey morocco, with silver lock:

- | | |
|----------------------------|---|
| 2 Patent-catch Handles. | 1 Finger Knife. |
| 1 Post's Exploring Needle. | 1 Metacarpal Saw. |
| 1 Tenaculum. | 1 Lancet. |
| 1 Gum Lancet. | 1 pair Straight Scissors. |
| 1 Sharp-pointed Bistoury. | 1 pair Dressing Forceps. |
| 1 Probe-pointed Bistoury. | 1 pair Spring-catch Fenestrated Artery Forceps. |
| 1 Tenotomy Knife. | 1 Spatula. |
| 1 Large Scalpel. | 1 Grooved Director and Aneurism Needle. |
| 1 Small Scalpel. | 2 Silver Probes. |
| | 1 Compound Catheter of sterling silver. |
| | 1 Caustic Case of sterling silver, made <i>seamless</i> . |
| | 6 Needles and Suture Silk. |
| | 2 coils Silver Suture Wire. |

POCKET CASES.

FIG. 1275.—Woodworth's Pocket Set.



Woodworth's Pocket Set.

\$22.

(By Dr. WOODWORTH, Surgeon-General Marine Hospital Service, U. S.)

Two-fold red morocco Case, with metal hinge and lock, very flat.

- 1 Male and Female Catheter, silver.
- 1 Vaccinating and 1 Exploring Lancet, concealed inside of the Catheter.
- 1 pair Scissors with 1 open ring.

- 1 Open Ring Dressing Forceps, answers for holding needles also.
- 1 Tenotome and Scalpel, white handle, spring back.
- 1 Sharp-pointed and 1 Probe-pointed Bistoury, white handle, spring back.
- 1 Abscess Lancet.
- 1 Silver Ear Spoon and Probe.
- 1 Steel Tenaculum and Delicate Ear Hook.
- 1 Director and Sims' Adjuster.
- 6 Needles, Silk and Wax.

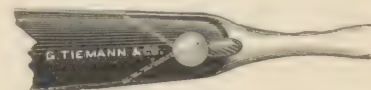
FIG. 1276.—Tiemann & Co.'s Patent-Catch Pocket Instruments. B.



Shank of blade.



End of handle, with turn-button in position to receive blade.



Handle and blade fastened.

Tiemann & Co.'s Patent Pocket Set. B.

\$28.

In morocco, velvet-lined Case.

2 Patent Handles (B), hard rubber, for following blades :

- 1 Exploring Needle.
- 1 Tenaculum.
- 1 Gum Lancet.
- 1 Curved Sharp-pointed Bistoury.
- 1 Curved Probe-pointed Bistoury.
- 1 Tenotomy Knife.
- 1 Large Scalpel.
- 1 Finger Knife.
- 1 Metacarpal Saw.
- 1 pair Straight Scissors.
- 1 Weir's Vaccinating Lancet and Comb.
- 1 Spatula and Elevator.
- 1 pair Silver Probes.
- 1 Parker's Sterling Silver Male and Female Catheter and *seamless* Caustic Case.

- 1 Dressing or Polypus Forceps, double crossing.
- 1 Spring-catch Fenestrated Bull-dog Artery Forceps and Needle Forceps, combined.
- 1 Director and Aneurism Needle.
- Needles and Silk.

Minor's Pocket Set.

\$22.50.

Two-fold morocco Case.

- 1 pair Spring-catch Forceps.
- 1 pair Hamilton's Artery Forceps.
- 1 Tenaculum and Aneurism Needle.
- 1 Sharp and 1 Blunt-pointed Tenotome.
- 1 Sharp-pointed Bistoury and Scalpel.
- 1 Silver Probe and Director.
- 1 pair Scissors.
- 6 Needles, Silk.
- 1 Silver Catheter and Caustic Case.

POCKET CASES.

Helmuth's Pocket Set.

\$32.

Either two or three-fold morocco Case.

- 1 Tenaculum and Hernia Knife.
- 1 Scalpel and Tenotome.
- 1 Sharp and Probe-pointed Bistoury.
- 1 Prout's Needle Forceps.
- 1 pair Fenestrated Artery Forceps.
- 1 pair Plain Artery Forceps.
- 1 pair Dressing Forceps.
- 1 pair Scissors.
- 1 Uterine Sound, to screw apart.
- 1 Thermometer.
- 1 Compound Catheter and Caustic Case, plated.
- 1 Steel Director.
- 2 Probes.
- 1 Exploring Trocar.
- 1 Hook and Adjuster.
- 6 Needles, Silk, Wax.

Dugas' Pocket Set.

\$56.

Turkey morocco Case lined with silk-velvet, silver lock, and chamois-leather pouch. Instruments have Tortoise-shell Handles with a very firm slide-catch; two strong blades in one handle; contents:

- 1 Jointed Porte Caustic, for nitrate of silver and sulphate of copper
- 1 Cataract Needle.
- 1 Male and Female Catheter, made of sterling silver.
- 1 pair Dissecting, Artery and Needle Forceps.
- 1 Thumb Lancet.
- 1 pair Delicate Artery Forceps.
- 1 Spatula and Elevator.
- 1 Belocq's Sound, of sterling silver.
- 1 pair Curved Scissors.
- 1 Ear Spoon and Tumor Hook.
- 1 Grooved Director, of sterling silver.
- 2 Eye Probes.
- 2 Probes and Director Probe, of sterling silver.
- 1 Porte Méche.
- 1 pair Polypus and Shot Forceps.
- 1 Dupuytren's Probang, with three silver joints and silver basket.
- 1 Large and 1 Small French Finger Knife.
- 1 Large and 1 Small Straight Bistoury.
- 1 Straight Probe-pointed Bistoury and Tenotome.
- 1 Gum Lancet and Exploring Needle.
- 1 Tenaculum and Artery Needle.
- 6 Curved and 6 Straight Needles.
- Silver Wire and Silk Sutures.

Regimental Surgeons' Pocket Set.

\$23.

Russia leather Case, with strong German silver lock. Instruments plain, single-bladed, Tortoise-shell Handles; contents:

- 1 Scalpel.
- 1 Sharp-pointed Bistoury.
- 1 Probe-pointed Bistoury.
- 1 Finger Bistoury.
- 1 Gum Lancet.
- 1 Small Razor.
- 1 pair Dressing Forceps.
- 1 Artery Needle.
- 6 Surgeon's Needles.
- 1 Exploring Needle.
- 1 Tenaculum.
- 1 Steel Director.
- 3 Silver Probes.
- 1 Silver Gilt Caustic Holder.
- 1 Compound Catheter.
- 3 yards Iron Wire for Sutures.
- 1 pair Plain Artery Forceps.
- 1 Tenotome.
- Ligature Silk and Wax.
- 1 Thumb Lancet.
- 1 pair Scissors.

Trepanning Set.

\$16.

- 1 Galt's Trephine.
- 1 Crown Trephine.
- 1 Trephine Handle.
- 1 Trepanning Scalpel and Raspatory.
- 1 Trepanning Elevator.
- 1 Hey's Skull Saw.
- 1 Brush for cleaning Trephine and Saw.
- 1 Mahogany Case.

Dugas' Dressing Case.

\$18.

One morocco Case lined with silk velvet, silver lock contents:

- 1 Silver Caustic Case.
- 1 Dissecting Artery and Needle Forceps.
- 1 Thumb Lancet.
- 1 pair Straight Scissors.
- 1 Grooved Director.
- 1 Silver Director with an eye.
- 1 Silver Grooved Probe.
- 1 Large and 1 Small Straight Bistoury.
- 1 Tenaculum and Gum Lancet.
- 6 Needles and Suture Silk.

POCKET CASES.

J. Williston Wright's Pocket Set, No. 1.

\$28.

Instruments with Spring Catch, Tortoise Shell Handles, enclosed in fine Morocco Case lined with silk velvet.

- 1 Scalpel and Probe-pointed Bistoury.
- 1 Tenotome and Sharp-pointed Bistoury.
- 1 Tenaculum and Gum Lancet.
- 1 Narrow Finger Bistoury and Aneurism Needle.
- 1 Fenestrated Artery Forceps and Needle Holder, slide catch.
- 1 Wood's Artery Forceps.
- 1 Thumb Forceps.
- 1 Thumb Lancet.
- 1 Straight Scissors, with one sharp and one blunt point.
- 1 Grooved Director and Ear Scoop.
- 1 Parker's Silver Compound Catheter and Caustic Case.
- 2 Silver Probes.
- 6 Needles and Silk.

J. Williston Wright's Antiseptic Pocket Set, No. 2.

\$38.

George Tiemann & Co.'s Patent Catch Instruments (Fig. 1275, page 71), adopted by Dr. J. Williston Wright for his Pocket Set, No. 2. In fine Russia Leather Case, lined with silk velvet.

- 2 Tiemann & Co.'s Patent (B) Catch, Hard Rubber Handles for the following blades :
 - 2 Scalpels.
 - 1 Finger Knife.
 - 1 Finger Knife, very narrow.
 - 1 Tenotome, blunt-pointed.
 - 1 Tenotome, sharp-pointed.
 - 1 Curved Bistoury, sharp-pointed.
 - 1 Curved Bistoury, blunt-pointed.
 - 1 Tenaculum.
 - 1 Aneurism Needle.
 - 1 Gum Lancet, short.
 - 1 Post's Canulated Needle.
 - 1 Metacarpel Saw.
 - 1 Fenestrated Artery Forceps.
 - 1 Open Ring French Jointed Scissors, one sharp and one blunt point.
 - 1 Dressing Forceps, open ring.
 - 1 Parker's Silver Compound Catheter and Caustic Case.
 - 1 Director and Ear Scoop.
 - 1 Thumb Forceps.
 - 1 Prout's Needle Forceps.
 - 1 Thumb Lancet.
 - 1 Heuel's Vulcellum Forceps, slide catch.
 - 2 Silver Probes.
 - 6 Needles, Silk and Wax.

Roswell Park's Antiseptic Pocket Set.

\$28.

Compact two-fold Case of Morocco Leather lined with silk velvet.

- 1 Park's Artery and Needle Forceps.
 - 1 Gross' Ear Curette and Spoon.
 - 1 Park's Articulated Angular Scissors, with open rings.
 - 1 Self-registering Fever Thermometer, in sterling silver case.
 - 1 Silver Director.
 - 1 Silver Probe.
 - 1 Silver Eyed Probe.
 - 1 Nelaton's Bullet Probe.
 - 1 Articulated Hæmostatic Forceps, with ratchet catch and open rings.
 - 1 Sterling Silver Caustic Case.
 - 1 Elastic Silk Catheter.
 - 2 Tiemann & Co.'s Patent Hard Rubber Handles (Fig. 1275, page 71), terminating in bevelled ends for separating tissues. To these handles the following Tiemann's Patent Blades are easily and firmly attached by turning up the button on the handle.
 - 1 Sharp-pointed Bistoury.
 - 1 Probe-pointed Bistoury.
 - 1 Tenaculum.
 - 1 Exploring Needle.
 - 1 Tenotome.
 - 1 Park's Straight Bistoury.
 - 1 Scalpel.
 - 1 Metacarpel Saw.
 - 6 Assorted Needles, Silk for Sutures, and Plastic Pins.
- All the steel instruments are nickel-plated, including the knife blades, &c. ; while all fittings are so made that they can be easily cleaned to prevent rusting.

J. W. Hayward's Antiseptic Pocket Set

\$21.

- 1 Compact Case, Morocco, lined with silk velvet.
- 2 Tiemann & Co.'s Patent Handles (Fig. 1275).
 - 1 Finger Saw.
 - 1 Narrow Straight Bistoury.
 - 1 Curved Sharp-pointed Bistoury.
 - 1 Curved Probe-pointed Bistoury.
 - 1 Small Gum Scarifying Lancet.
 - 1 Short Tenaculum.
 - 1 Delicate Exploring Needle.
 - 1 Small Scalpel.
 - 1 Large Scalpel.
- 1 set Jointed Silver Probes.
 - 1 Eye Probe.
 - 1 Nelaton's Bullet Probe.
 - 1 Director.
 - 1 Plain Probe.
- 1 Hæmostatic Forceps, articulated.
- 1 Scissors.
- 1 Artery Forceps, with Silver, Needles and Silk

DRESSING.

"Let the dressing be destitute of any irritating quality, and so arranged that the surfaces of the wound may be kept in gentle apposition throughout if closed, and free from all irritants if open, while free escape of discharge is maintained."—Dr. Stephen Smith.

MATERIALS FOR THE ANTISEPTIC DRESSING OF WOUNDS.

Lister's Antiseptic Gauze, in 6 yard pieces.
Lister's Silk Protective, by the yard.
McIntosh Waterproof Cloth, by the yard.
Oiled Muslin, by the yard.
Jaconet, Carbolized.
Lister's Carbolized Catgut, in bottles.

Carbolized Cotton.
Borated Cotton.
Van Brun's Wound-Dressing Cotton.
Dennison's Absorbent Cotton.
Animal Ligature, Carbolized, Dry.

BANDAGES.

FIG. 1277.—Roller Bandage.



FIG. 1278.

Martin's Solid Rubber Bandage.
FOR THE TREATMENT OF ULCERS, ECZEMA,
VARICOSE VEINS, &c.



Dr. Martin himself inspects the process of manufacture at every stage, and is personally responsible for the excellence of every bandage thus manufactured. Every bandage is stamped with a *fac simile* of his autograph signature in carmine ink. *No bandage without this stamp is guaranteed by him.*

We have been appointed by Dr. Martin agents for the wholesale and retail sale of his bandages. To fulfill every possible requirement they are made in twenty (20) numbers, of different lengths and widths, and of four degrees of thickness, as follows:

SIZES AND PRICES.

No. 1	STUB'S WIRE.		Thickness, 22	Price, \$2.00	Postage, \$0.08
	FEET.	INCHES.	GAUGE.		
" 1A	Length, 10½	Width, 3	" 24	" 1.75	" .07
" 1B	" 10½	" 3	" 28	" 1.50	" .06
" 2	" 21	" 3½	" 22	" 4.50	" .20
" 2A	" 21	" 3½	" 24	" 4.00	" .15
" 2B	" 21	" 3½	" 28	" 3.00	" .12
" 3	" 6	" 2½	" 22	" .75	" .05
" 3A	" 6	" 2½	" 24	" .60	" .05
" 4	" 15	" 3½	" 20	" 4.00	" .15
" 5	" 5	" 3½	" 20	" 1.30	" .08
" 6	" 7½	" 3½	" 20	" 2.00	" .10
" 7	" 14	" 3	" 24	" 2.00	" .08
" 8	" 14	" 3	" 28	" 1.75	" .08
" 9	" 21	" 3	" 22	" 4.00	" .16
" 9A	" 21	" 3	" 24	" 3.00	" .14
" 9B	" 21	" 3	" 28	" 2.50	" .12
" 10	" 12	" 2	" 22	" 1.75	" .08
" 11	" 15	" 2½	" 22	" 2.25	" .10
" 12	" 2	" 2½	" 22	" .50	" .03
" 13	" 2	" 3	" 22	" .60	" .04

Adhesive Plasterper yd. \$0.75
Moleskin Adhesive Plaster, on twilled goods, " 1.50

Roller Bandage.....per lb. \$1.50
Marine Lint, in a tin box, about 1 lb..... 1.00

HOT WATER DRESSING, see page 41.

DRESSING.

FOR CLEANSING WOUNDS.

Pus Basins, Wound Syringes, of Hard Rubber and Metal, and Surgical Syringes.

FIG. 1279.—Tiemann & Co.'s Universal Douche (constant current).

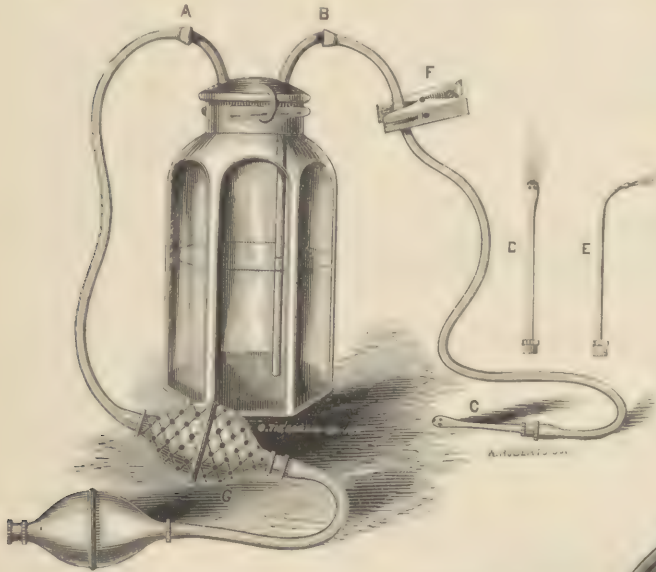


FIG. 1280
Warren's Soft Rubber Pus Basin.

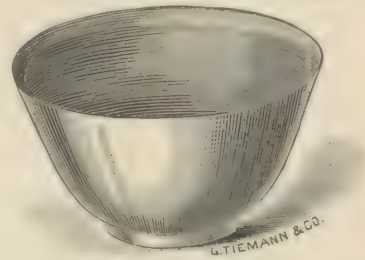


FIG. 1281.—Triangular Pus Basin.
Hard Rubber.



FIG. 1282.—Ellis' Drainage Spiral.



DRAINAGE.

FIG. 1283.—Hamilton's Drainage Tube Carrier.



FIG. 1284.—Chassaignac's Drainage Trocar.



FIG. 1285.—Black Rubber Drainage Tubing (any size of gauge.)

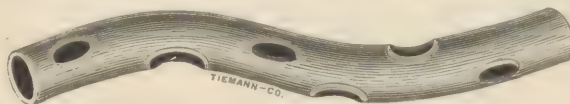
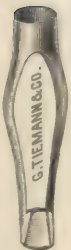


FIG. 1286.—Hemel's Punch, for cutting drainage openings.



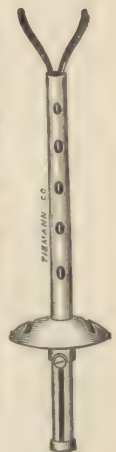
Tiemann & Co.'s Velvet Eye Drainage Tubes.

Neubert's Bone Drainage Tubes.

CHICKEN BONE DRAINAGE TUBES.

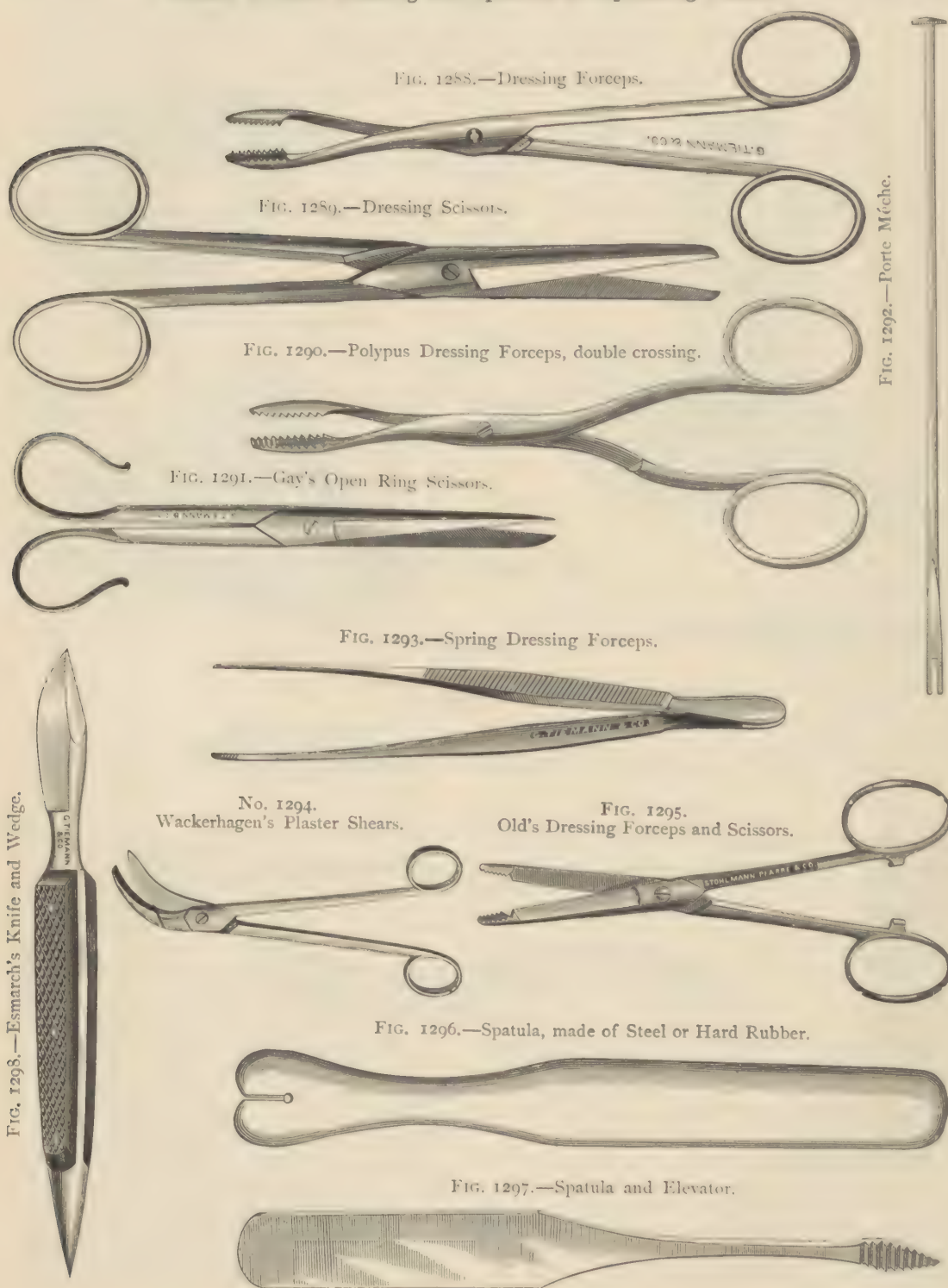
The tibia and femora of chickens, cooked, form the materials. The bones are not injured by cooking. They are taken, scraped, and put in a solution of hydrochloric acid and water (1 to 5) until soft. Their articular extremities are then snipped off with a pair of scissors; the endosteum is raised at one end and pushed through to the other extremity, along with its contents. The bones are then reintroduced into the acid solution until they are rendered a little more pliable and softer than what is ultimately required (as they afterwards harden a little by steeping in the carbolyzed solution). When thus prepared they are placed in a solution of carbolic acid and glycerine (1 to 10). At the end of a fortnight they are ready for use. Before introduction into the wound they are threaded with horsehair, which are pulled out in a few days, leaving the tubes perfectly open. The tubes gradually become absorbed in the tissues; the average time required being eight days.

FIG. 1287.—Callender's Drainage Canula.



DRESSING.

Instruments for the Application and Removal of Lint and Cotton Wool Dressing, for Removing Plaster of Paris Dressing and Spatulas for Spreading Plasters.



DRESSING.

Caustic Cases and Sponge Holders for Carrying and Applying Escharotics, Pocket-case Catheters for Relieving the Male and Female Bladder of Urine, Blood or Pus, and Exploring Needles.

FIG. 1301.—Dugas' Caustic Case.



FIG. 1299.—Caustic Case, Silver.



FIG. 1300.—Parker's Compound Catheter and Caustic Holder.

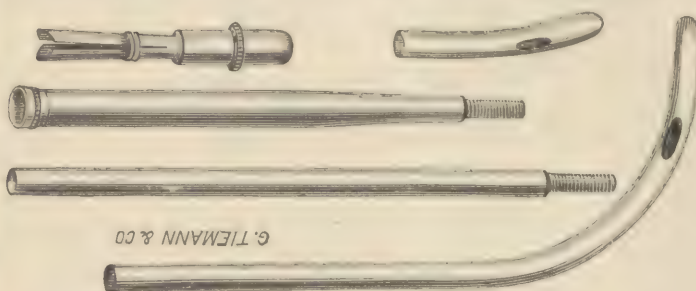


FIG. 1303.—Child's Brush and Caustic Holder.

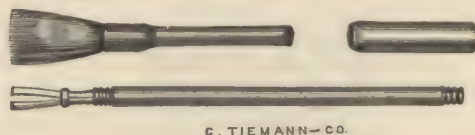


FIG. 1304.—Porte Caustique and Eye Curette.



FIG. 1305.—Compound Catheter.

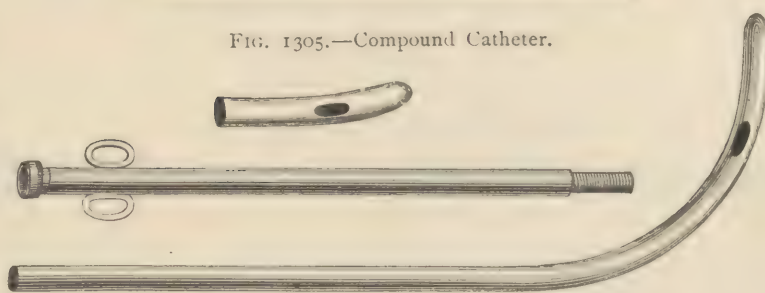


FIG. 1306.—Tiemann & Co.'s Flexible Joint Catheter.

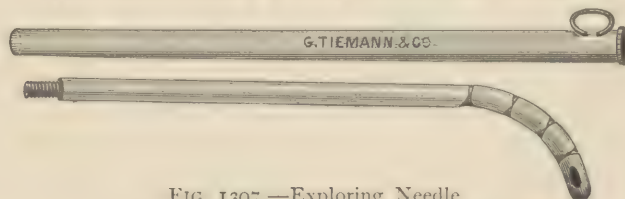


FIG. 1307.—Exploring Needle.



FIG. 1302.—Dugas' Caustic Case.



FIG. 1309.—Exploring Director.

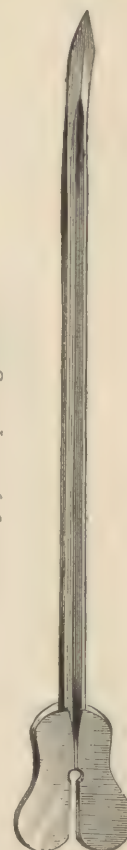


FIG. 1308.—Caustic Case, Hard Rubber and Silver.



SUTURES AND LIGATURES.

Various materials are used for sutures, as catgut, horsehair, silkworm gut, salmon gut, silk, hemp, silver, iron and lead. Carbolized catgut is unirritating; so is horsehair, but not very flexible. Silk must be free from poisonous coloring material; braided silk is best. Hemp resembles silk, but is much harsher. Dr. C. J. Cleborne, U. S. N., recommends "hard-ash" three-ply manilla. Silver wire for sutures should be pure; iron wire must be annealed, to make it soft.

FIG. 1310.—Satin Sewing Silk, for surgical purposes—will not kink or curl during the operation of sewing.



The Plaited
Satin Sewing Silk.



FIG. 1311.—Black Iron-Dyed Silk.



The
Ordinary Twisted Silk.

DITTEL'S ELASTIC LIGATURE
(1 yard long) exerts a constant elastic pressure upon the parts ligated with it.

CHINESE BEAD SILK,
very fine, white or black, for
ophthalmic operations.

FIG. 1312.—Closely Twisted Silk. 3 sizes.



ISHIGURO WHALE TENDON LIGATURE.

The whale tendon ligature is imported by us from Japan and is the invention of Dr. Ishiguro, the Chief Surgeon of the Imperial Japanese Army. In its preparation a whale tendon is teased out until the fibres look very much like those of hemp. Then the longest and finest fibres are selected and spun together as ordinary silk thread. According to the reports of the Japanese surgeons who have tested them—some of whom, having been connected with the Japanese army in active service, have had excellent opportunity to test them—the results have been eminently satisfactory. Dr. Skene used them. (See "Transactions of the Obstetrical Society of Philadelphia," stated meeting, Thursday, September 1, 1881.) "My experience with this kind of suture is as follows: I first used two of six sutures in restoring the cervix, one on each side. The other sutures used were silk. At the end of a week, when I came to remove the sutures, I found the ends of the Japanese sutures in the vagina—the portion included in the tissue had all disappeared. In my next case (in which the cervix and perineum were both operated upon at the same sitting) I had only two silk sutures, and all the rest Japanese. The sutures were removed from the perineum at the end of a week, and at the end of three weeks the cervix was examined and the two silk sutures were found in place, but there was not a trace to be found of the Japanese sutures. In my next case, in which the two operations were performed together, Japanese sutures were used exclusively in the cervix. At the end of the third week the cervix was healed completely and the sutures had all disappeared.

SUTURES AND LIGATURES.

OX AORTA LIGATURE.

In the "Transactions of the Royal Medical and Chirurgical Society," (*British Medical Journal*, March 19, 1881), will be found the report of a discussion on the ox aorta ligature, by Dr. R. Barwell. In it he claims superiority for this ligature over catgut, in that it needs no preparation, being simply cut from the fresh aorta and dried for use; like all soft connective tissues, also, it is gradually absorbed, and in this respect it has the advantage over the catgut. The latter, judging by the action of sutures, is absorbed in from forty-eight hours to two weeks. The ox aorta furnishes a flat ligature, by which any amount of pressure can be applied to the artery without injury to the coats. Dr. Barwell considers this an advantage. Several specimens were shown in which the arteries were occluded. Mr. Lister, however, states that the catgut prepared by his new method is fully equal to the aorta, and regards the division of the walls of the vessel as desirable.

SUTURE NEEDLES.

FIG. 1313.—Full Curve Suture Needles.



FIG. 1314.—Ligature and Ruptured Perineum Needle.

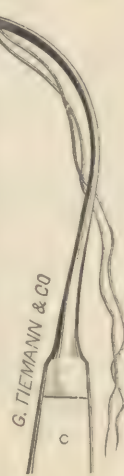


FIG. 1315.—Half Curve Suture Needles.



FIG. 1319.—Tiemann & Co.'s Hollow Needle for Wire Sutures.



FIG. 1320.—Needles for Vesico-Vaginal Fistula.



FIG. 1316.—Wire Suture Needles.

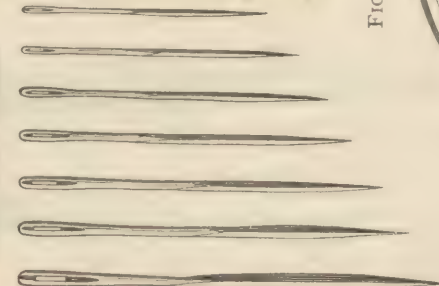


FIG. 1317.—Finnell's Post Mortem Needle.



FIG. 1318.—Buck's Pin Conductor.

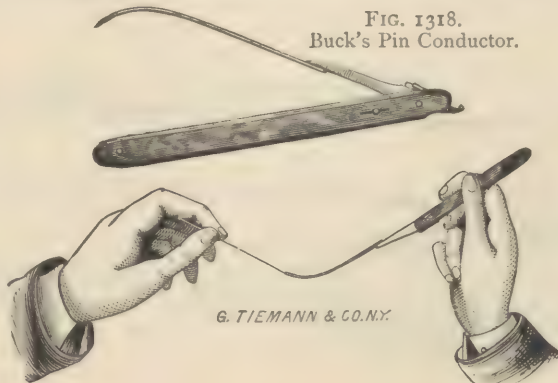


FIG. 1321.—Open-Eyed Needle.

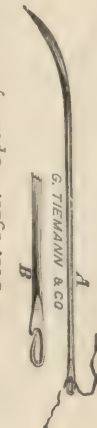


FIG. 1322.—Van Brun's Needle.



SUTURE NEEDLES AND HOLDERS.

FIG. 1323.—Allis' Suture Forceps.



FIG. 1324.—Goetz's Suture Instrument, with Endless Thread.

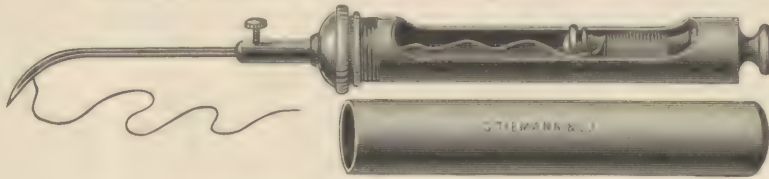


FIG. 1325.—Cleborne's Tenaculum Needle and Wire Twister.

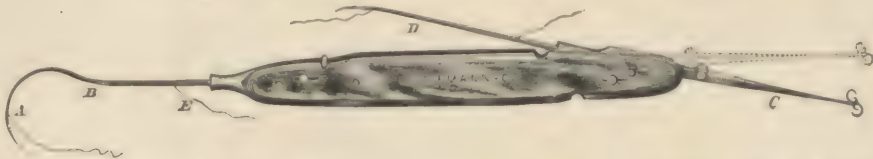


FIG. 1328.—Mathis' Needle Holder.



FIG. 1329.—Needle Forceps.



FIG. 1330.—Wyeth's Needle Forceps.

FIG. 1331.
Heuel's Needle
Forceps.FIG. 1332.
Reiner's Needle
Forceps.

FIG. 1333.—Hoff's Automatic Suture.



FIG. 1334.—Roux's Needle Holder.



FIG. 1335.—Parker's Needle Holder.



FIG. 1336.—DeGaime's Russian Needle Holder.

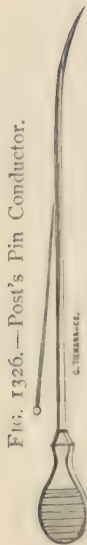


FIG. 1326.—Post's Pin Conductor.

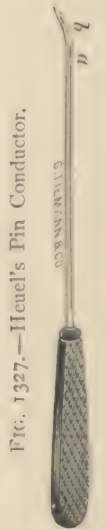


FIG. 1327.—Heuel's Pin Conductor.

NEEDLE HOLDERS.

FIG. 1337.—Sims' Needle Forceps.



FIG. 1338.—Stimson's Needle Holder and Cutting Forceps.

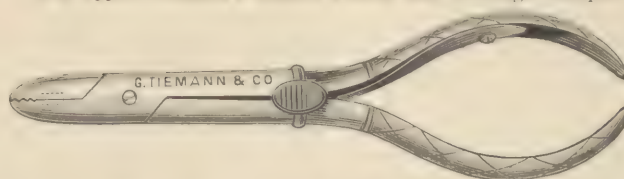


FIG. 1339.—Küster's Swan Needle Holder.

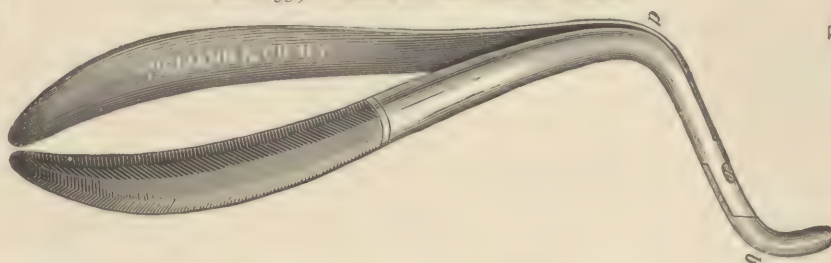


FIG. 1341.—Sand's Needle Forceps.



FIG. 1340.—Prout's Needle Forceps.



Illustrations of other Needles and Holders, for special operations, will be found in their proper places.

PROBES AND DIRECTORS,

FOR EXPLORING WOUNDS AND GUIDING OPERATING KNIVES.

FIG. 1342.—Delicate Probe Director and Tongue Tie.



FIG. 1343.—Silver Probes.

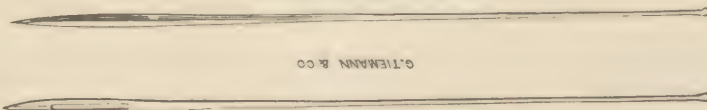


FIG. 1344.—Director and Tongue Tie.



FIG. 1345.—Director and Aneurism Needle.



FIG. 1347.—Hunter's Director.

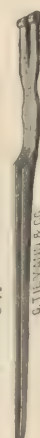
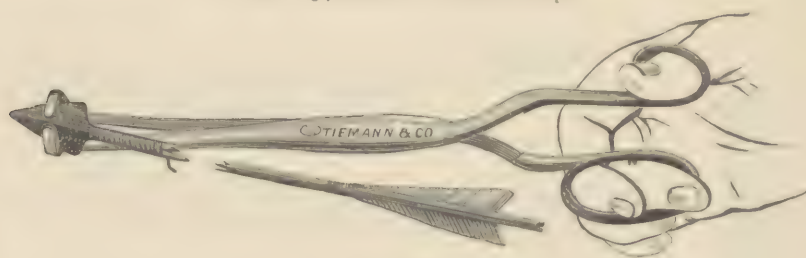


FIG. 1346.—Hamilton's Set of Director Probes.



ARROW AND BULLET EXTRACTING.

FIG. 1348.—Bill's Arrow Forceps.



BULLET.

FIG. 1349.—Bullet Seeker, Burr Head.



FIG. 1350.—Nelaton's Bullet Probe, Porcelain Head.



FIG. 1351.—Eldridge's Bullet Probe.



FIG. 1352.—Sayre's Vertebrated Bullet Probe, Nelaton Point.

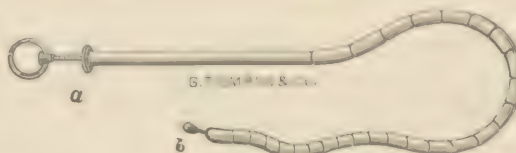


FIG. 1353.—Hamilton's Director Probes, Nelaton Point.

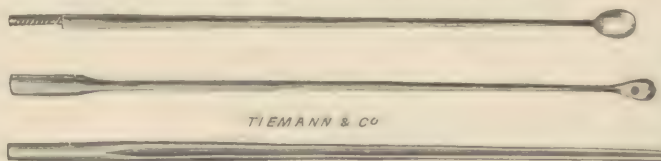
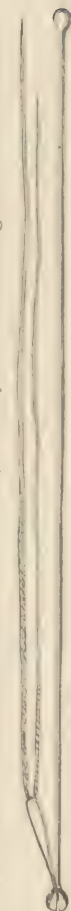


FIG. 1354.—Long Silver Bullet Probes.



FIG. 1355.—Tiemann & Co.'s Bullet Probe, with Eye for introducing Lint into Wounds.



When it is difficult to determine the presence of a bullet in a wound by means of the common probe, the burr-head seeker or Nelaton's porcelain-head probe, if rotated against the suspected ball, will show fragments or traces of color of lead.

Forceps and other bullet extractors should be light and slender, but strong enough to allow of the application of considerable force. Various patterns are in use of more or less antiquity and usefulness. Tiemann's bullet forceps differ from others in principle. The good quality of this instrument consists mainly in that it has *only one point* on each lever, admitting of the seizure of any part of a ball or other foreign body, and by then pulling on the instrument it will revolve between the points and follow in the track of the wound, presenting its long axis to the line of the wound.

Tiemann & Co.'s Bullet Forceps have been introduced into the European Armies during the late Franco-German War; it is highly recommended by the Army Surgeons, and styled by them "the *American Bullet Forceps*." It is also of material service in the removal of portions of necrosed bone.

When the course of a ball is circuitous, or when it is imbedded among swollen and infiltrated tissues, the flexible bullet forceps may be used with advantage.

BULLET EXTRACTING.

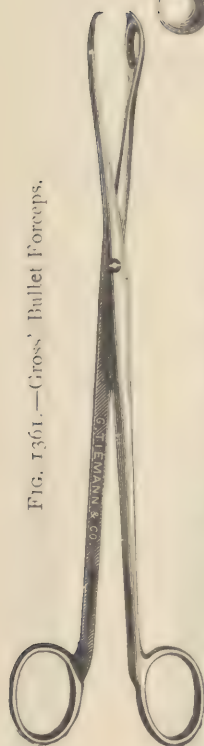


FIG. 1361.—Gross' Bullet Forceps.



FIG. 1362.—Bullet Screw.

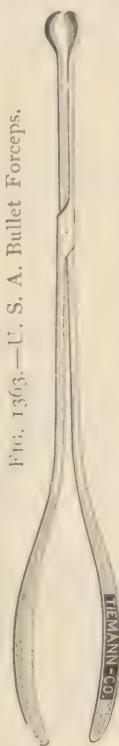


FIG. 1363.—U. S. A. Bullet Forceps.

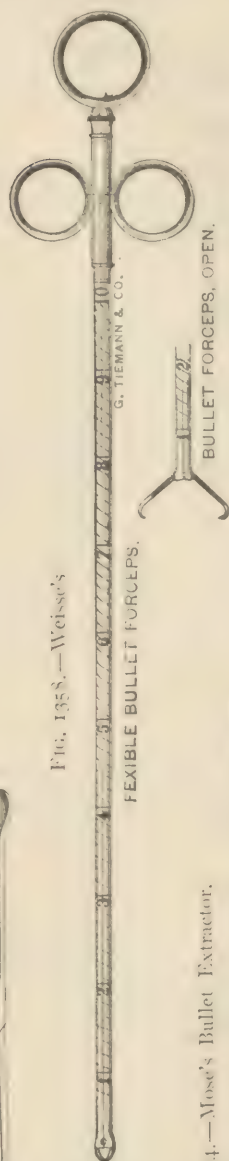


FIG. 1358.—Weisse's

FLEXIBLE BULLET FORCEPS.

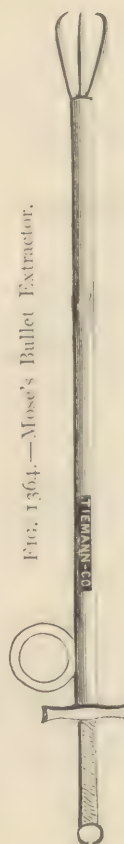


FIG. 1364.—Mose's Bullet Extractor.

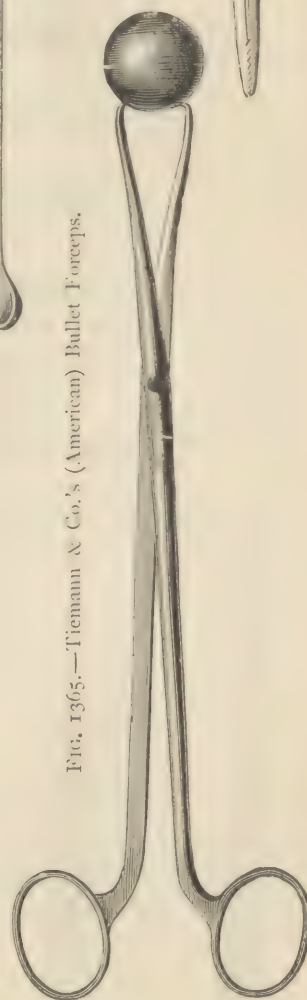


FIG. 1365.—Tiemann & Co.'s (American) Bullet Forceps.

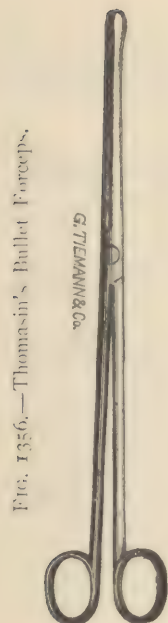
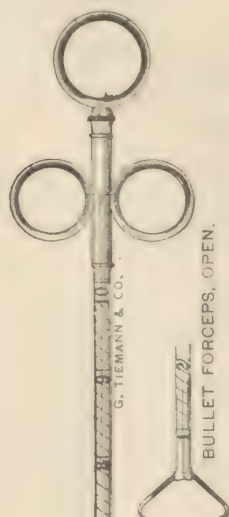


FIG. 1356.—Thomasin's Bullet Forceps.



FIG. 1357.—Tiemann & Co.'s Flexible Bullet Forceps.



BULLET FORCEPS, OPEN.



FIG. 1359.—Bullet Scoop.

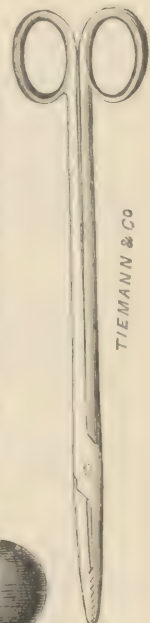


FIG. 1360.—Hamilton's Bullet Forceps.

FASCIOTOMY, MIOTOMY, TENOTOMY AND DRY DISSECTING.

FIG. 1366.—Feruled Operating Scalpels.



FIG. 1367.—Finger Knife.



FIG. 1368.—Straight Blunt-pointed Bistoury.



FIG. 1369.—Sharp-pointed Bistoury.



FIG. 1370.—Probe-pointed Bistoury.



FIG. 1371.—Cooper's Hernia Knife.



FIG. 1372.—Concave Edged Tenotome.



FIG. 1373.—Convex Edged Tenotome.



FIG. 1374.—Blunt-pointed Tenotome.



FIG. 1375.—Sharp-pointed Tenotome.

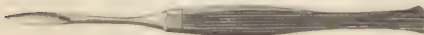


FIG. 1388.—Hamilton's Dry Dissector.



FIG. 1389.—Hamilton's Dry Dissector.



FIG. 1390.—Double Hook.



FIG. 1391.—White's Graduated Surgical Knife.



FIG. 1392.—Post's Tissue Separator.



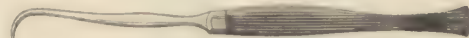
FIG. 1393.—Hamilton's Dry Dissector.



FIG. 1394.—Hamilton's Dry Dissector.



FIG. 1377.—Feruled Tenaculum.



G. TIEMANN & CO. N.Y.

FIG. 1378.—Aneurism Needle.



FIG. 1379.—Little's Small Scalpel.

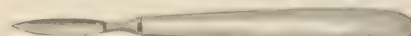


FIG. 1380.—Little's Medium Scalpel.

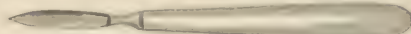


FIG. 1381.—Little's Large Scalpel.



FIG. 1382.—Little's Straight Bistoury.



FIG. 1383.—Little's Probe-pointed Bistoury.



FIG. 1384.—Little's Hernia Knife.



FIG. 1385.—Little's Sharp-pointed Bistoury.



FIG. 1386.—Little's Aneurism Needle.



FIG. 1387.—Little's Tenaculum.



FIG. 1376.—Little's Retractor.



FASCIOTOMY, MIOTOMY, TENOTOMY.

FIG. 1395.—Tenaculum.



FIG. 1396.—Straight Finger Knife.

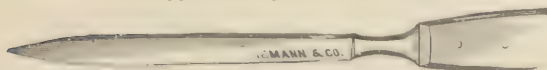


FIG. 1399.—Curved Sharp-pointed Bistoury.



FIG. 1397.—Cooper's Hernia Knife.



FIG. 1400.—Medium Scalpel.

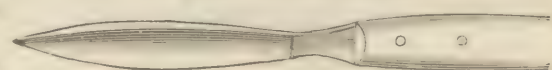


FIG. 1398.—Curved Probe-pointed Bistoury.



FIG. 1401.—Small Scalpel.



FIG. 1402.—Large Scalpel.

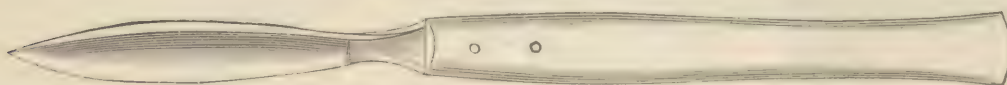


FIG. 1403.—Artery Scissors, or for opening other small Canals.

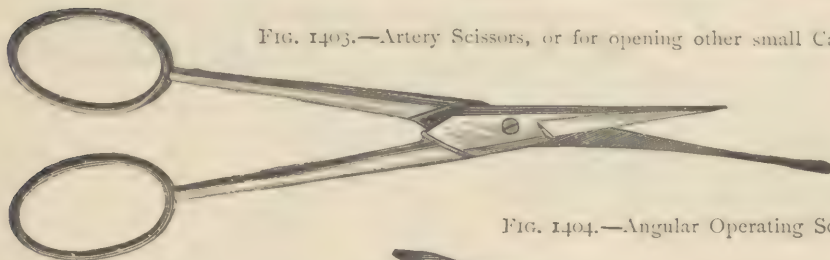


FIG. 1404.—Angular Operating Scissors.

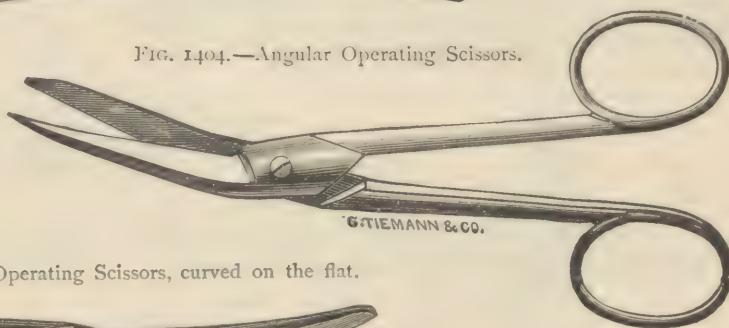


FIG. 1405.—Operating Scissors, curved on the flat.

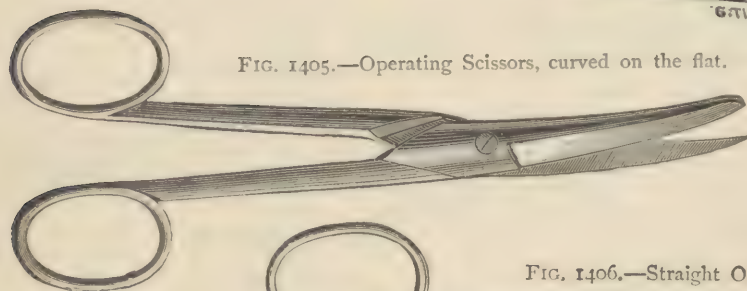
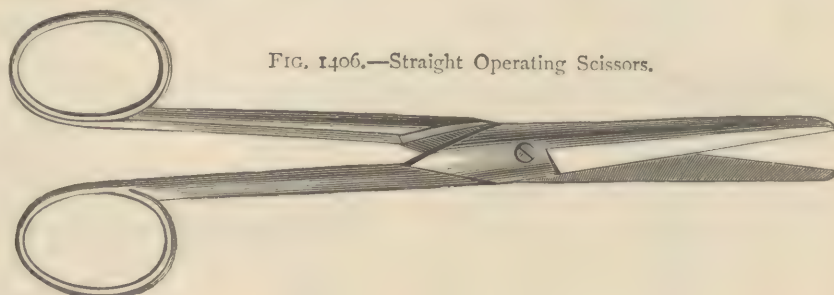
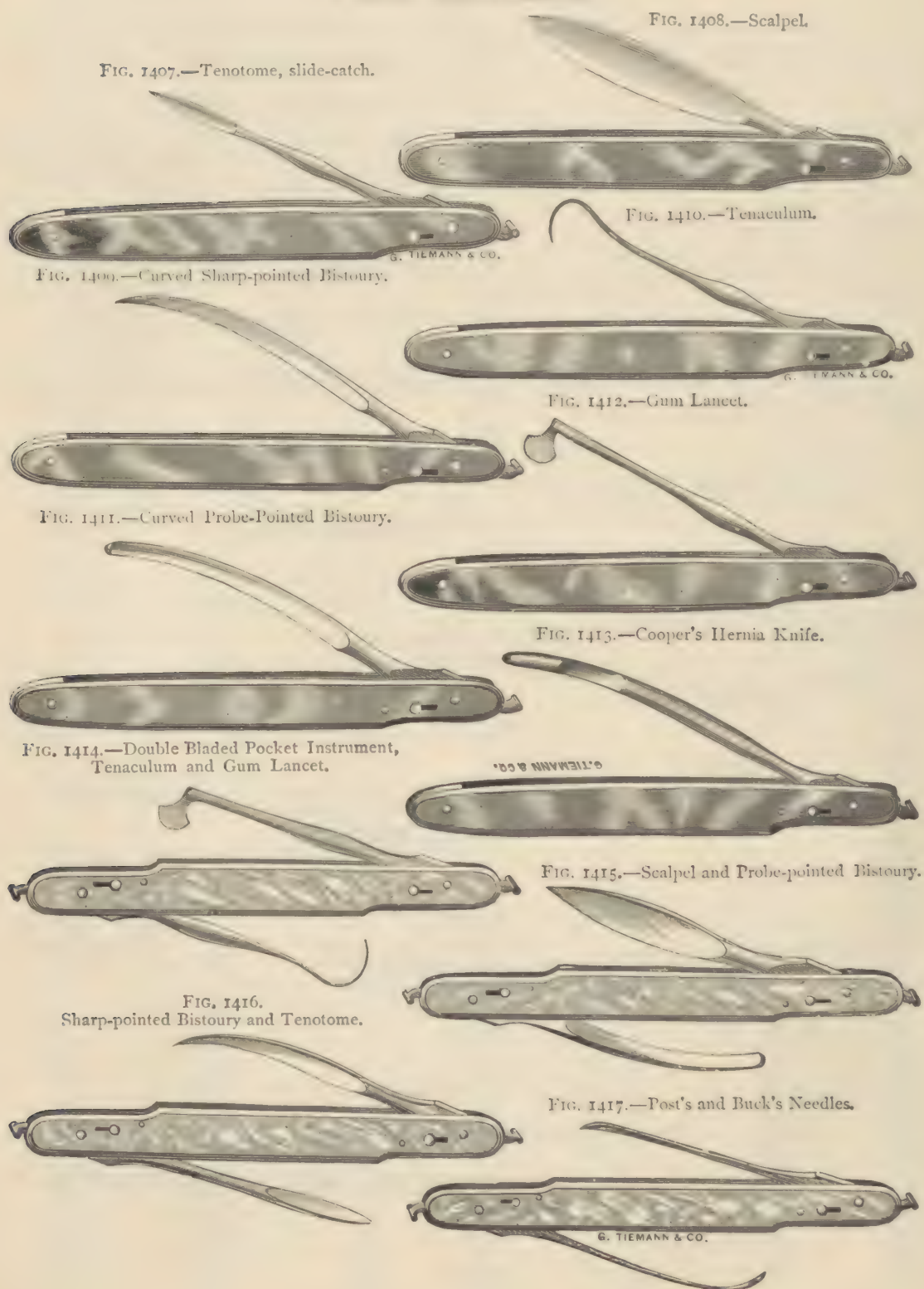


FIG. 1406.—Straight Operating Scissors.



FASCIOTOMY, MIOTOMY, TENOTOMY.

POCKET INSTRUMENTS.



FASCIOTOMY, MIOTOMY, TENOTOMY.

POCKET INSTRUMENTS.

FIG. 1418.—Spring-catch Gum Lancet and Tenaculum.



FIG. 1419.
Abscess Lancet.

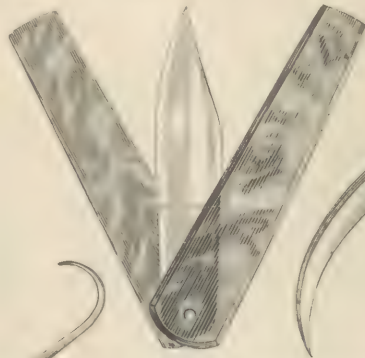


FIG. 1420.—Syme's Abscess Knife and Scalpel.

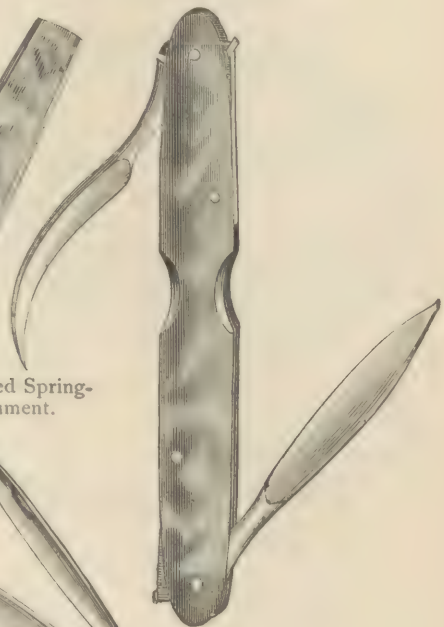


FIG. 1421.—Four-bladed Spring-catch Pocket Instrument.

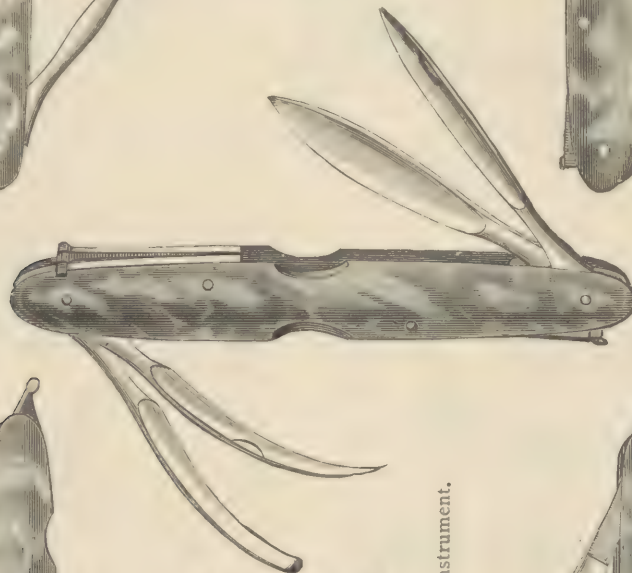


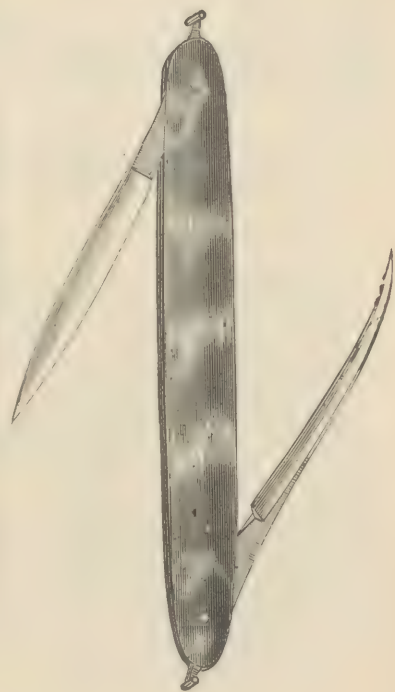
FIG. 1422.—Plain Single-bladed Pocket Instrument.



FIG. 1423.—Seton Needle.



FIG. 1424.—Plain Double-bladed Pocket Instrument.



ARTERIAL.

For Suspending the Circulation and Preventing Loss of Blood during Capital Operations; for Arresting Arterial Hæmorrhage in Wounds and for Local Treatment of Aneurisms.

FIG. 1425.—May's Tourniquet, for the Treatment of Aneurism.

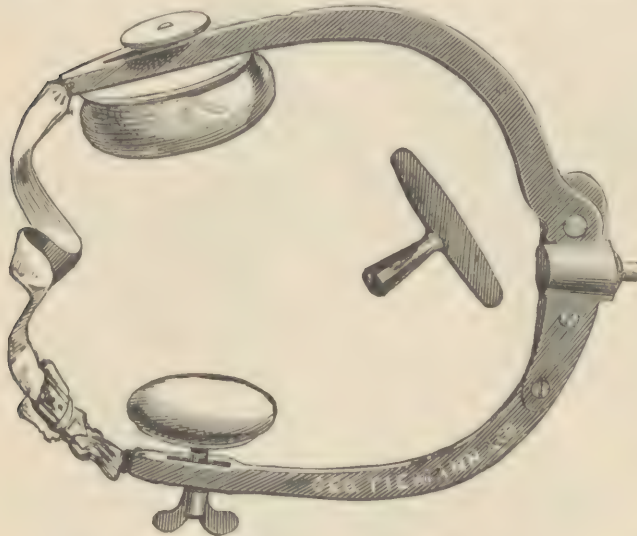


FIG. 1426.—Skey's Arterial Compressor.

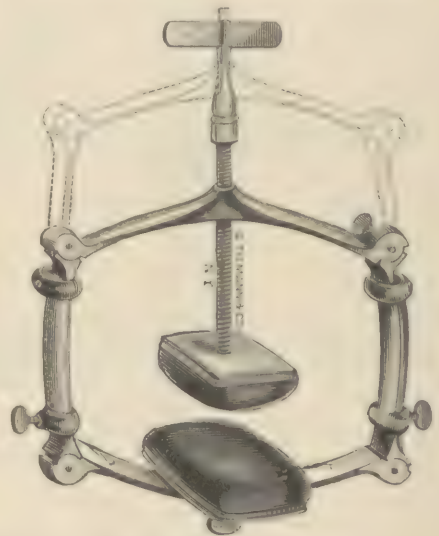


FIG. 1427.—Briddon's Artery Compressor.

FIG. 1428.—Buck's Arterial Compressor.

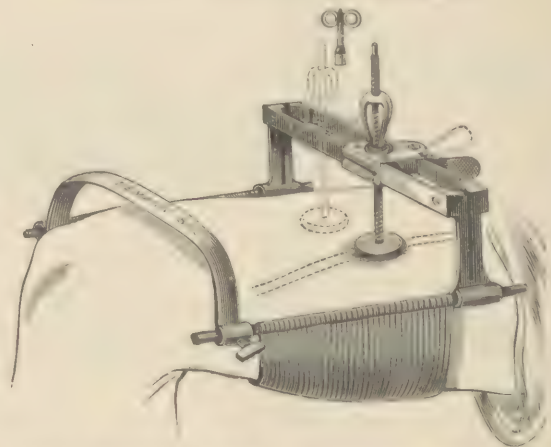
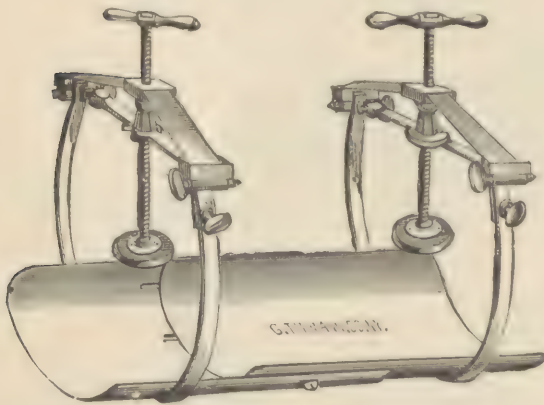
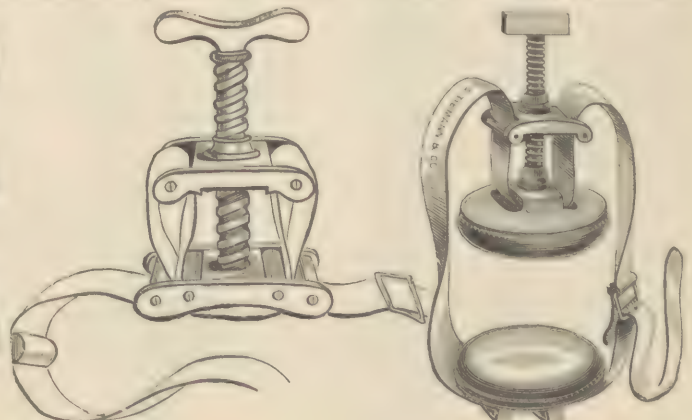
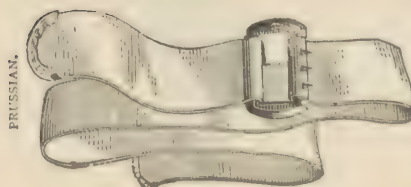
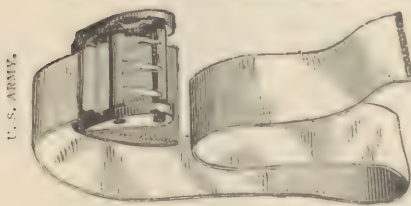


FIG. 1429.—Field Tourniquets.

FIG. 1430.—Peti's Spiral Tourniquet.

FIG. 1431.—Charrière's Tourniquet.



ARTERIAL.

For Suspending the Circulation and Preventing Loss of Blood during Capital Operations; for Arresting Arterial Hæmorrhage in Wounds and for Local Treatment of Aneurisms.

FIG. 1432.—Esmarch's Bandage Clamp.

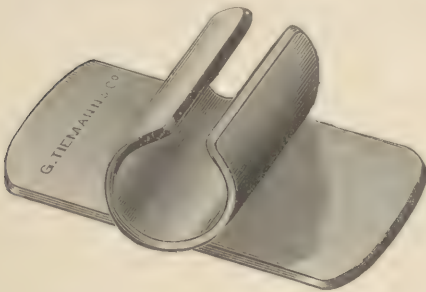


FIG. 1433.—Erichson's Arterial Compressor.

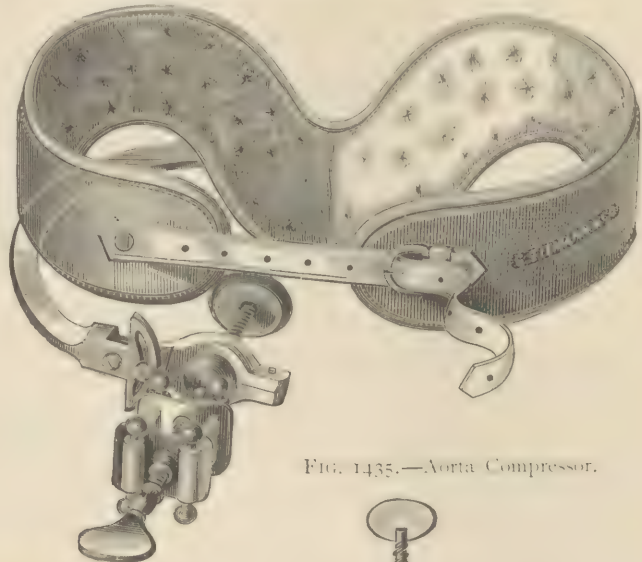


FIG. 1434.
Langenbeck's Bandage Clamps, for
Esmarch's Bloodless Method.

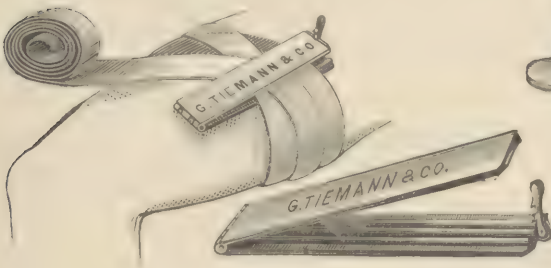


FIG. 1435.—Aorta Compressor.

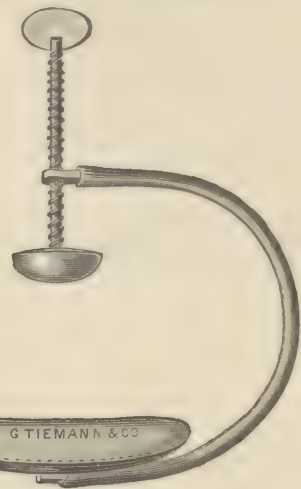


FIG. 1436.
Valentine Mott's Tourniquet.



FIG. 1437.
Gross' Tourniquet.

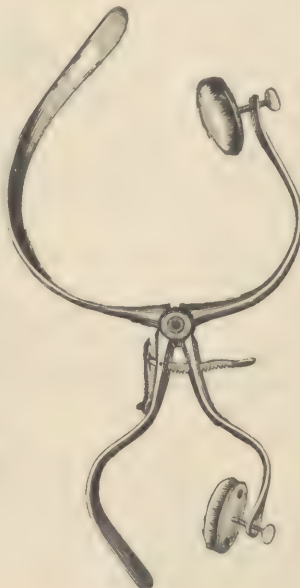


FIG. 1438.—Tiemann & Co.'s
Direct Pressure Tourniquet.

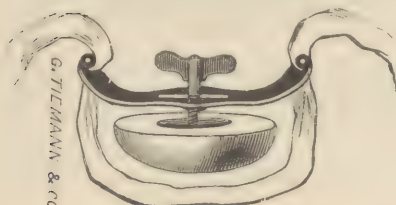


FIG. 1439.—Spohn's
Rubber Ring Tourniquet.



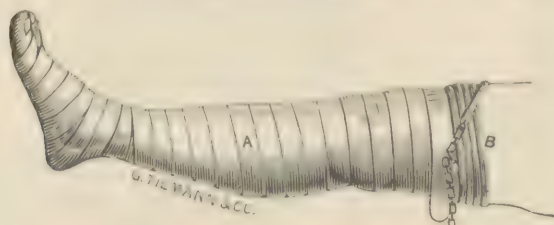
ARTERIAL.

For Suspending the Circulation and Preventing Loss of Blood during Capital Operations.

"ESMARCH'S BLOODLESS METHOD."

FIG. 1440.—Esmarch's Tourniquet.

(Extracted from *Sammlung Klinischer Vorträge*, No. 58, Leipzig, 1873.)



* * * "I shall perform an operation (necrotomy, both legs) which would cause a much more profuse hæmorrhage than that of yesterday, did I not adopt a method which will enable us to completely control the bleeding.

"While the anæsthetic is being administered, we envelop the lower portion of the limb in oil silk, to prevent soiling the bandage; then we bandage the legs tightly from the toes to above the knees with this elastic rubber bandage (A), which, by gradual compression, forces the blood out of the vessels of the limb. Immediately above the knee, where the bandage terminates, we wind the rubber cord or tubing (B) four or five times around the thigh, and join the one extremity by means of the attached hook to the chain at the other end. The rubber tubing or cord compresses all the soft parts, including the arteries, in such a perfect manner that not a drop of blood can enter the bandaged portion of the limb.

"This tourniquet possesses the advantage over all others, viz.: it can be adjusted to any portion of the limb, and the location of the principal arteries need not be considered.

"We now remove the elastic bandaging and the oil silk, and you will notice that both legs, below the tourniquet, present the appearance of the limbs of a corpse, the pallor of the same forming a remarkable contrast to the rosy hue of the skin above. You will also notice that we will operate exactly *as though on a cadaver*. * * *

"After the operation, the rubber cord is slowly removed, the circulation restored, and those arteries which have previously remained unnoticed, tied. * * *

"The slumbering patient presents the same appearance as before the operation, his pulse is full and strong, and convalescence will no doubt follow much more rapidly and surely than if we had performed the operation in the customary manner.

"The tourniquet can be used with more or less complete success in nearly all operations on the extremities. In extirpation of tumors, in the removal of scrofulous sores or caries, and resections of small bones or joints, you can proceed in the manner I have just demonstrated, viz.: you need not loosen the tourniquet until the wound has been dressed."

ESMARCH'S BANDAGE CLAMP, see Fig. 1432.

LANGENBECK'S BANDAGE CLAMP for Esmarch's Bloodless Method, see Fig. 1434.

FIG. 1441.—Emmett's Uterine Tourniquet, for controlling Hæmorrhage during Operations on the Uterus.



The instrument has a portion of a watch spring passed through a canula, and in the handle a ratchet to tighten the loop about the cervix. Just before constricting the neck with the instrument, sufficient vaginal tissue is drawn through the loop with a tenaculum; the folds thus formed render the instrument less liable to slip over the cervix when it has become reduced in size from the escape of blood.

ARTERIAL.

For Seizing and Holding Divided Vessels after an Operation, and for Closure by Ligature, or by Torsion.

FIG. 1442.—Prince's Tenaculum Forceps.



FIG. 1443.—Coxeter's Artery Forceps.



FIG. 1444.—Spring-catch Artery Forceps.



FIG. 1445.—Plain Artery Forceps.



FIG. 1446.—Torsion Forceps.



FIG. 1447.—Andrews' Artery Forceps.



FIG. 1448.—Hamilton's Spring-catch Artery Forceps.



FIG. 1449.—Old's Artery and Needle Forceps.



FIG. 1450.—Wheeler's Torsion Forceps.



FIG. 1451.—Phelps' Artery and Torsion Forceps.



FIG. 1452.—Spring-catch Fenestrated Artery Forceps.

FIG. 1453.—Esmarch's Fenestrated Artery Forceps.

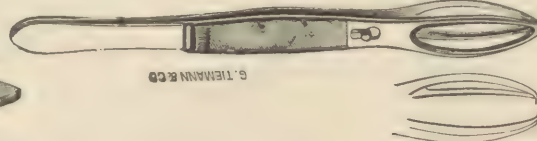


FIG. 1456.—Hunter's Artery and Needle Forceps.

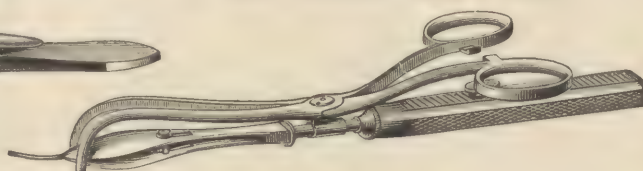
FIG. 1454.—Esmarch's Bulbous Artery Forceps, Slide-catch.



FIG. 1455.—Esmarch's Torsion Forceps, Slide-catch.



FIG. 1457.—Hewson's Torsion Forceps.



ARTERIAL.

FOR APPLYING LIGATURES.

FIG. 1458.—Carroll's Knot Tyer.

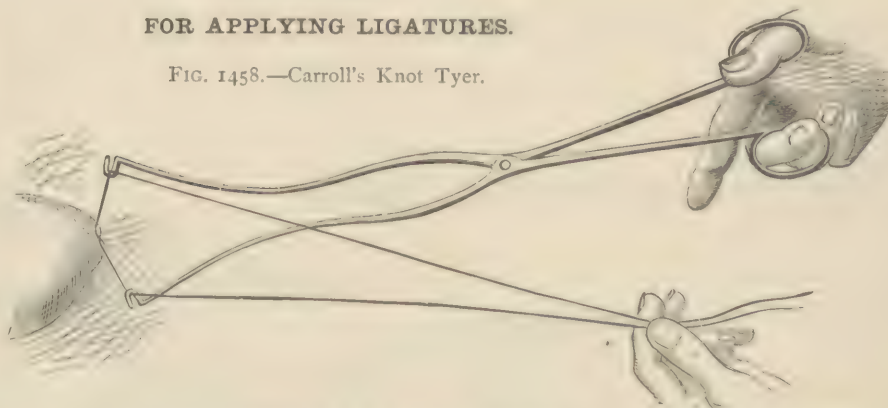


FIG. 1460.—Mott's Set of Aneurism Needles.

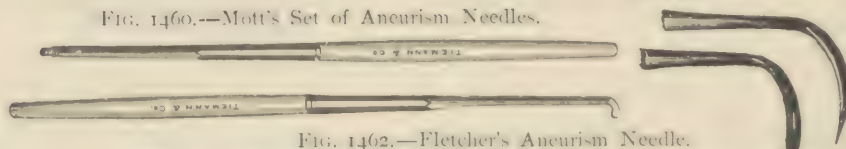


FIG. 1462.—Fletcher's Aneurism Needle.



FIG. 1463.—Plain Aneurism Needle.



FIG. 1464.—Helical Needle for Sutures and Ligatures.



FIG. 1465.—Wight's Artery and Ligature Forceps.



FIG. 1466.—Ostrom's Drainage Tube and Ligature Carrier.



FIG. 1467.—Helmuth's Ligature Carrier.

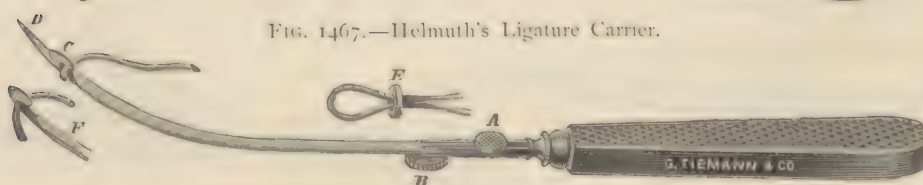


FIG. 1459.—Bigelow's Artery Forceps.



FIG. 1461.—Crampton's Artery Needles.



ARTERIAL.

For Arresting Hæmorrhage during or after Operations by means of Acupressure and Compression.

FIG. 1468.—Stearn's Artery Claw-Forceps.



FIG. 1470.—Bilroth's Artery Clamps.



FIG. 1472.—Gross' Artery Compressor.



FIG. 1474.
Allis' Acupressure Forceps.

FIG. 1475.
Allis' Acupressure Forceps.

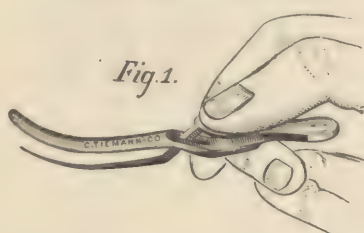
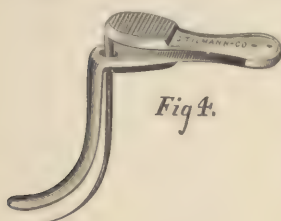


FIG. 1469.
Acupressure Pins,
for arresting
Surgical Hæmorrhage.

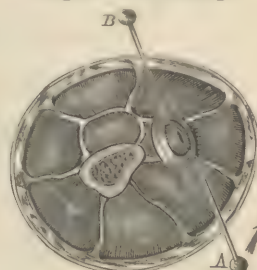


FIG. 1471.
Mattock's Key-Ring
Artery Clamp.



FIG. 1473.
Allis' Acupressure Forceps.

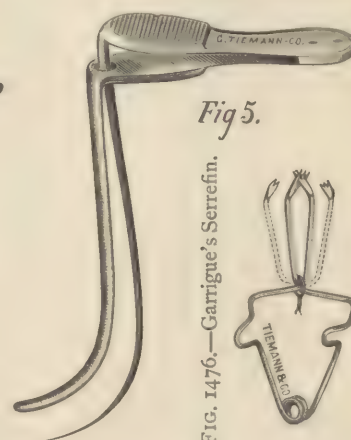


Fig 5.

FIG. 1476.—Garrigue's Serrefin.



FIG. 1477.
b. Vidal's Serrefin, Straight.
c. Vidal's Serrefin, Angular.
d. Langenbeck's Serrefin.

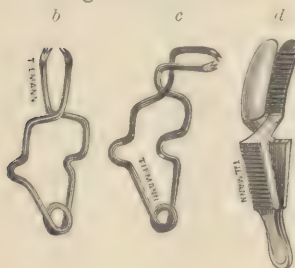


FIG. 1478.—Milne's Artery
Compression Forceps.

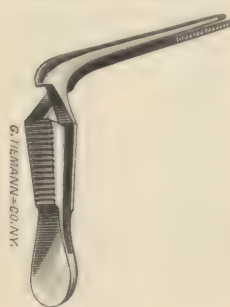


FIG. 1479.—Allis' Acupressure Forceps.



Fig 3

FIG. 1480.—Allis' Acupressure Forceps.



Fig 2

Note.—ALLIS' ACUPRESSURE FORCEPS are for instantaneous arrest of hæmorrhage during surgical operations.

ARTERIAL.

For Closing Divided Vessels by Clamping, Constriction and Arteriversion.

FIG. 1481.—Nott's Artery Clamp Forceps.

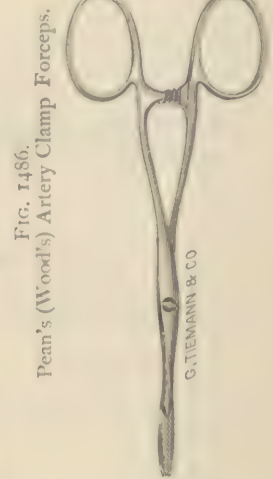
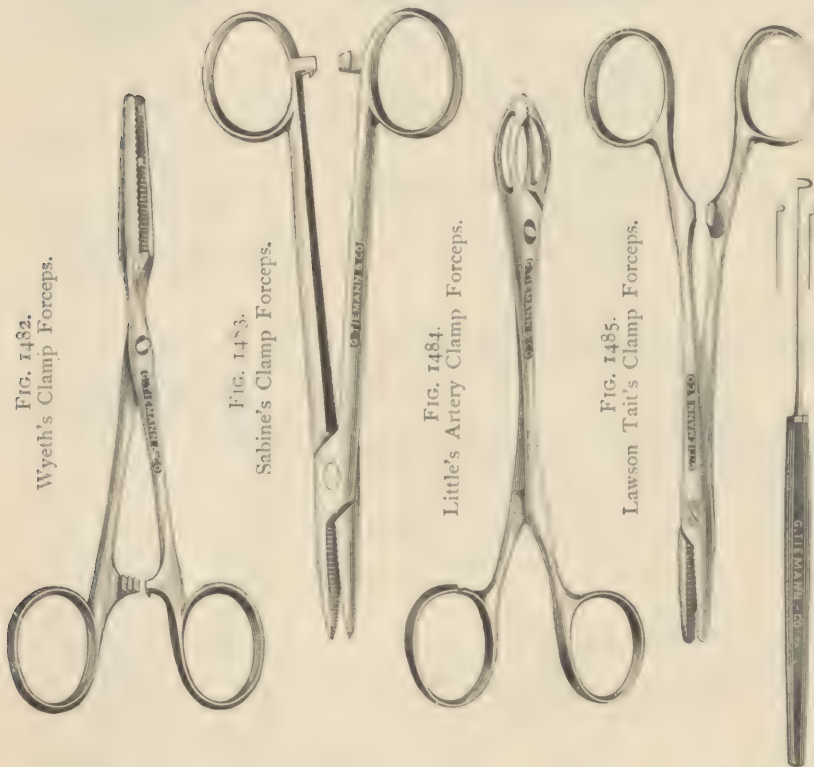
FIG. 1486.
Pean's (Wood's) Artery Clamp Forceps.

FIG. 1482.

Wyeth's Clamp Forceps.

FIG. 1483.

Sabine's Clamp Forceps.

FIG. 1484.

Little's Artery Clamp Forceps.

FIG. 1485.

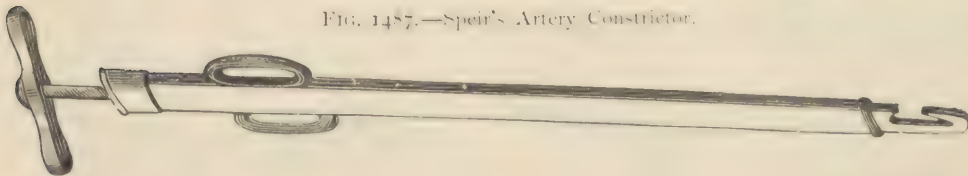
Lawson Tail's Clamp Forceps.

FIG. 1488.

Weber's Tenaculum,
for Arteriversion.

This method is designed to reinforce the cut extremity of the artery by duplication of its walls, and thus secure such an amount of muscular structure around the cut end as will effectually close its calibre against the impulse of the heart's action. The point of the tenaculum is introduced within the artery, and, holding the margin with the forceps, traction on the hooks inverts the coats, as the cuff of a sleeve is rolled backward.

FIG. 1487.—Spein's Artery Constrictor.



A substitute for the ligature acupressure and torsion—designed for the instantaneous hermetic closure of arteries, without the use of ligatures or other foreign substance to be left in the wound. The application of the constrictor is very simple. The artery is to be caught up by a pair of forceps and the tongue of the constrictor placed around the vessel, the tongue is then drawn tightly upon the artery by means of the vice arrangement at the upper end of the instrument. As soon as the screw turns with a considerable degree of resistance, or the internal and middle coats are seen to be invaginated sufficiently, by noticing their movements in the end of the artery, the instrument is to be detached from the artery and the operation is completed.

AMPUTATING.

Knives, Catlings, Scalpels, Tenaculums—for Division of the Soft Parts.

ANÆSTHETIC APPARATUS, page 43.

Find on page

AMPUTATING SETS, page 63.

FIG. 1489.—Amputating Tenaculum.



FIG. 1490.—Amputating Scalpel.



FIG. 1491.—Cartilage Knife.



- 97, SAWS.
- 103, BONE FORCEPS.
- 91, ARTERY FORCEPS.
- 79, NEEDLES.
- 78, LIGATURE.
- 88, TOURNIQUETS.
- 74, ELASTIC BANDAGES.
- 102, PERIOSTEOTOMES.
- 49, ANTISEPTIC SPRAY.
- 96, ANTISEPTIC KNIVES.

FIG. 1492.—Cartilage Knife.



FIG. 1493.—Amputating Scalpel.



FIG. 1494.—Amputating Tenaculum.



FIG. 1495.—Small Catling.



FIG. 1496.—Wood's Circular Knife.



FIG. 1497.—Liston's Small Knife.



FIG. 1498.—Parker's Knife.



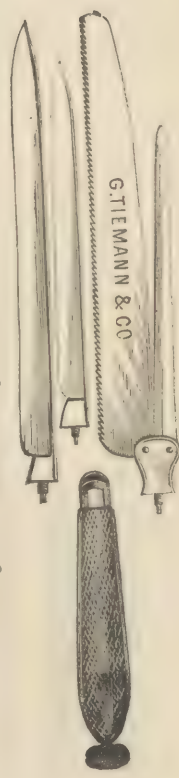
FIG. 1499.—Liston's Long Knife.



FIG. 1500.—Wight's Folding Knife.



FIG. 1501.—Conant's Amputating Knives and Saw.



AMPUTATING.

ANTISEPTIC KNIVES.

For Division of the Soft Parts in Major and Minor Operations.

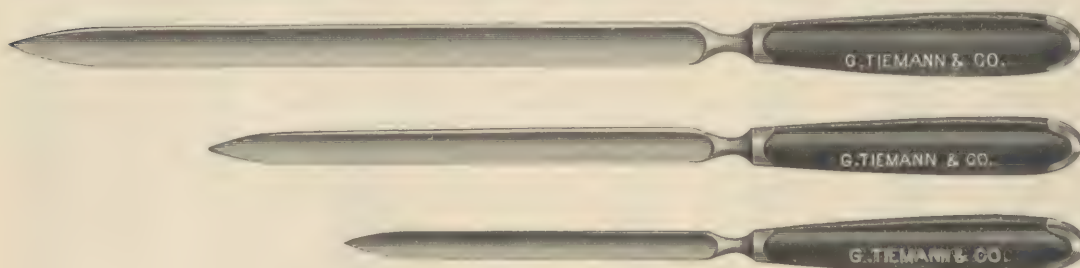
Esmarch has devised Antiseptic Knives made of one piece of steel, so as to afford no lodgment for septic germs, which might possibly adhere to ordinary knives. One objection to these is, that the handles become quite slippery if wet with blood; in order to obviate this, we have made antiseptic knives of which the handles are baked on, of hard rubber, but contain no crevices whatever. Any instrument constructed in this way is as if made of one piece, and affords the perfect customary hold.

Liston's Amputating Knives.

FIG. 1502.—Long.

FIG. 1503.—Medium.

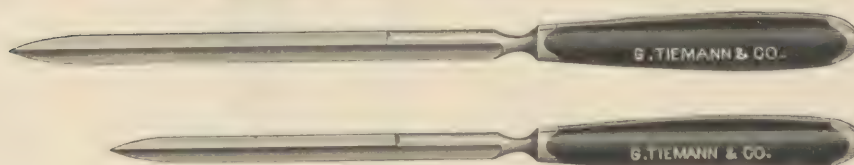
FIG. 1504.—Small.



Catlings.

FIG. 1505.—Long.

FIG. 1506.—Medium.



FIGS. 1507, 1508.—French Finger Knives.



Bistouries.

FIGS. 1509, 1510, 1511.



Scalpels.

FIGS. 1512, 1513, 1514, 1515, 1516.



Tenotomes.

FIGS. 1517, 1518, 1519, 1520.



AMPUTATING.

BONE SAWS.

Saws should be kept in a state of scrupulous cleanliness, as the teeth afford organic matter great opportunity of becoming adherent; this may convey contagion to the next person operated on. Rust and other matter may poison the wound. Clean the teeth, after and before use, with warm water and a stiff tooth-brush, then dry with chamois.

FIG. 1521.—Metacarpal Saw.

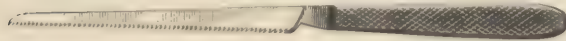


FIG. 1522.—Lifting-back Metacarpal Saw.

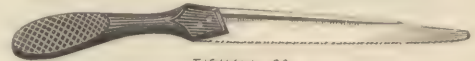


FIG. 1525.—Lifting-back Saw.

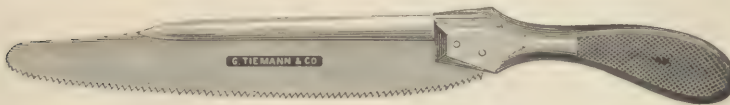


FIG. 1526.—Tiemann & Co.'s Capital Saw.

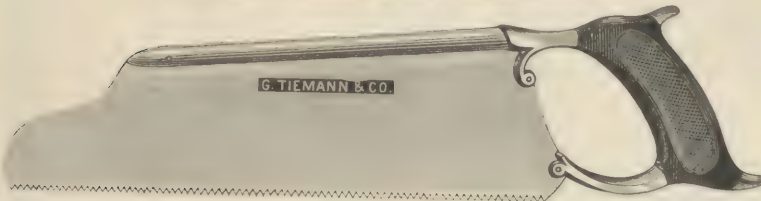


FIG. 1527.—Satterlee's Capital Saw.

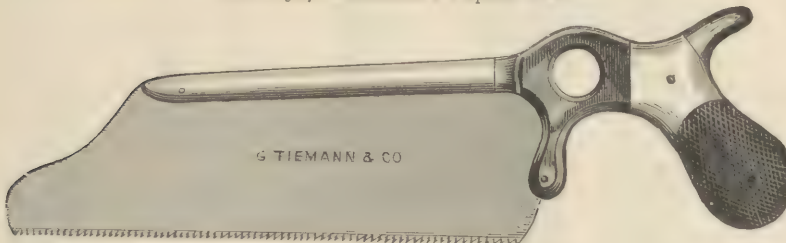


FIG. 1528.—Parker's Capital Saw.

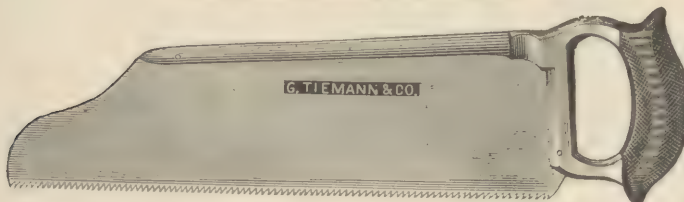
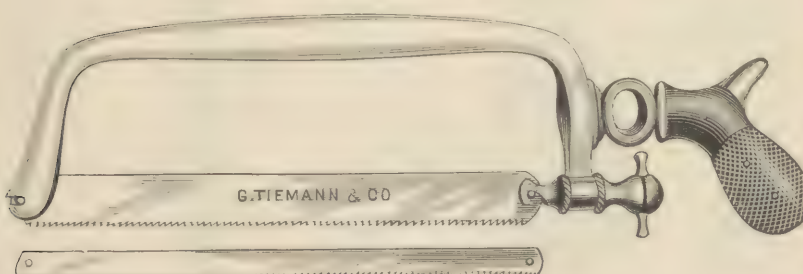


FIG. 1529.—Tiemann & Co.'s Bow Saw, with two blades.



TIEMANN & CO.

FIG. 1523.—Lente's Interosseous Saw.



FIG. 1524.—Detmold's Metacarpal Saw.



TIEMANN & CO.

FIG. 1530.
Lewis' Folding Saw.



GEO. TIEMANN & CO.

TREPANNING.

FIG. 1531.
Brace Trephine and Guarded Crown.



FIG. 1532.—Crown Trephine.



FIG. 1533.—Galt's Trephine.



FIG. 1534.—Trephine Handle.

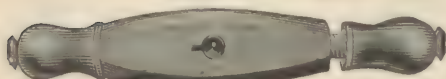


FIG. 1539.—Hey's Saw.



FIG. 1542.—U. S. A. Respiratory.



FIG. 1543.—Hey's Saw.



FIG. 1544.—Plain Trepanning Elevator.



G. TIEMANN & CO.



FIG. 1545.—Trepanning Elevator and Lenticular Knife.



FIG. 1546.—Lenticular Knife.



FIG. 1547.—Trepanning Elevator and Rasps.



FIG. 1535.—Raspatory.



FIG. 1536.—Pope's Antrum Drill.



FIG. 1537.—Van Buren's Trepanning and Sequestrum Forceps.

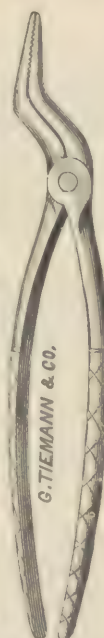


FIG. 1538.—Trepanning Scalpel.



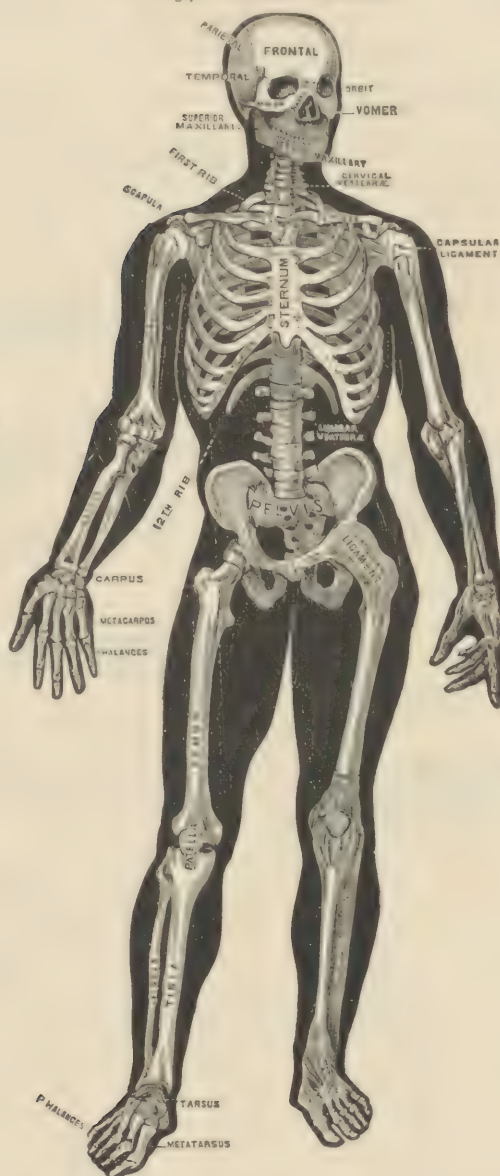
FIG. 1541.—Hand Trepan.



TREPANNING SET, page 72.

OSTEOLOGICAL.

FIG. 1548.—Human Skeleton.



SKELETONS.

Articulated by means of brass screws.

Grades 1, 2, 3.

SKULLS.

Plain and disarticulated.

FEMALE PELTS.

Without ligaments.

With ligaments.

FEET.

Strung on catgut

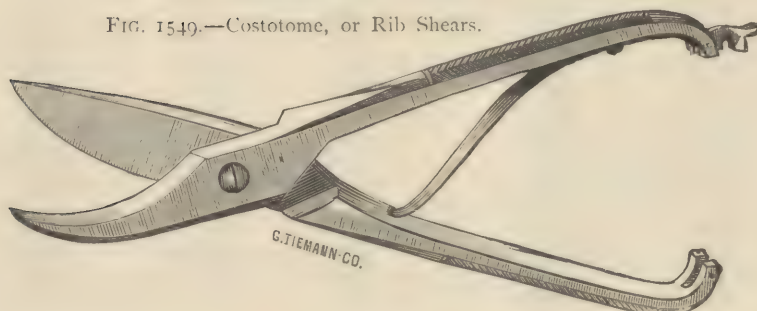
HANDS.

Strung on catgut.

BRASS SCREWS AND HINGES.

OSTEOTOMY.

FIG. 1549.—Costotome, or Rib Shears.



OSTEOTOMY.

Retractors for drawing back the Soft Parts to Protect them against Injury by Saws or Knives during Operations on Bones.



OSTEOTOMY.

Forceps for Holding Bone during an Operation and for the Removal of Dead Bone (Sequestrum).

FIG. 1565.—Ferguson's Lion-jaw Bone-holding Forceps.

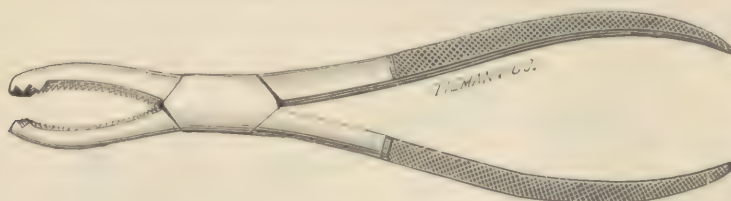


FIG. 1566.—Hamilton's Serrated Bone Cutter.

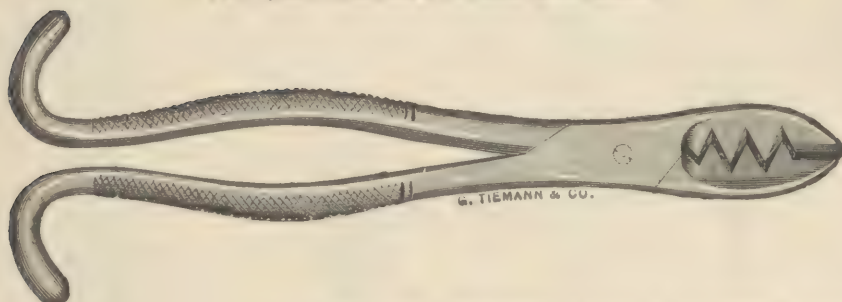
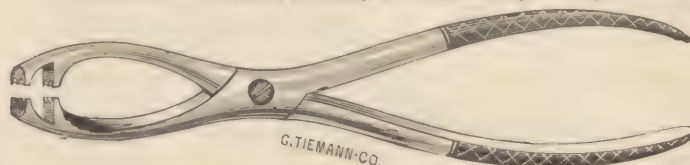


FIG. 1567.—Ferguson's Lion-jaw Bone-holding Forceps.



VAN BUREN'S
SEQUESTRUM FORCEPS,
see Fig. 1537, page 98.

FIG. 1568.—Ferguson's Sequestrum Forceps.

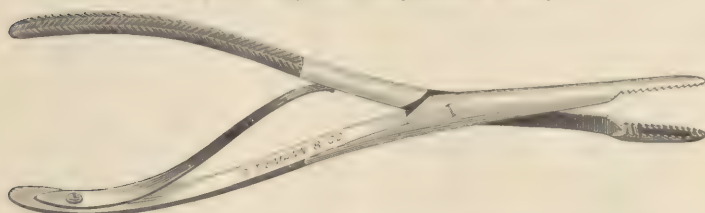


FIG. 1569.—Farabeuf's Osteophor.

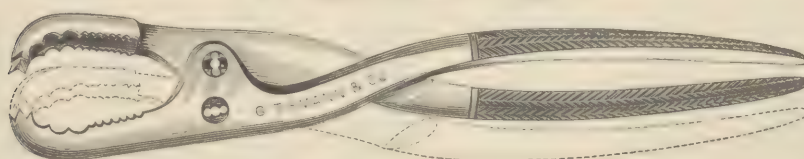


FIG. 1570.—Hamilton's Osteophor.

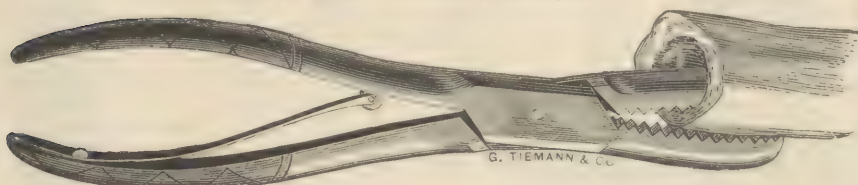
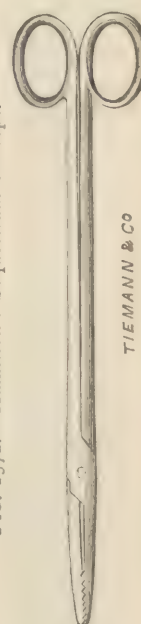


FIG. 1571.—Markoe's Curved Sequestrum Forceps.



FIG. 1572.—Hamilton's Sequestrum Forceps.



OSTEOTOMY.

MALLETS, CHISELS, GOUGES AND LEVATORS.

For Rounding Sharp Edges of Bones, Removing Spiculæ, Clearing out Carious Cavities and Dividing and Raising the Periosteum.

FIG. 1573.—Szymanowsky's Gouge.



FIG. 1574.—Gouge.



FIG. 1575.—Chisel.

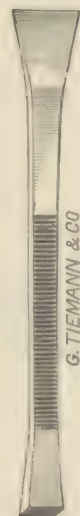


FIG. 1576.—Lead Mallet.



FIG. 1577.—Darby's Chisel Gouges and Levator.

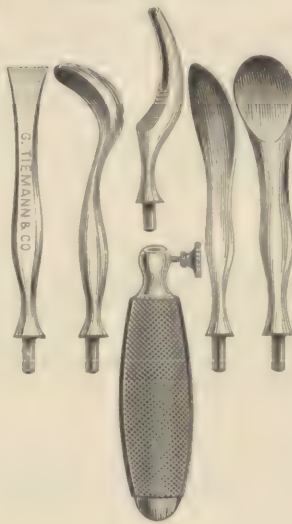


FIG. 1578.—Linhardt's Knife Chisel.



FIG. 1579.—Curved Hand Gouge.



Other forms of CHISELS and GOUGES made to order, to suit the fancy of operators.

FIG. 1580.—Hamilton's Levator.



FIG. 1581.—Goodwillie's Curved Levator.



FIG. 1582.—Goodwillie's Half-curved Levator.



FIG. 1583.—Sayre's Periosteome.



FIG. 1584.—Sands' Periosteome.



FIG. 1585.—Scalpel and Raspatory.



FIG. 1586.—Whitehead's Hoe, for Dividing Mucro-Periosteal Membrane.



FIG. 1587.—Hebra's Bone Scoop.



FIG. 1588.—Langenbeck's Bone Hook and Levator.



OSTEOTOMY.

FORCEPS AND RONGEURS.

For Section of Small Bones, for Rounding the Edges in Amputations and Gnawing off Projecting Parts, not accessible to other instruments, in Resection.

FIG. 1589.—Liston's Bone Forceps, Straight.



FIG. 1590.—Hoffman's Gouge Forceps.

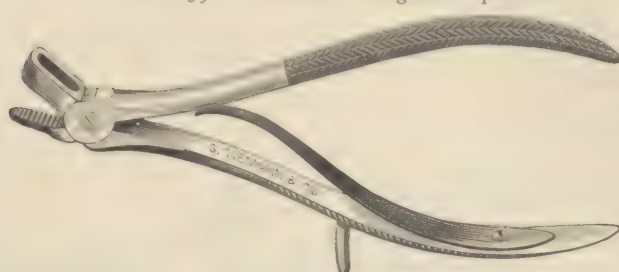


FIG. 1591.—Liston's Bone Forceps, curved on the flat.



FIG. 1592.—Liston's Bone Forceps, Knee Curve.



FIG. 1593.—Satterlee's Straight Bone Forceps.

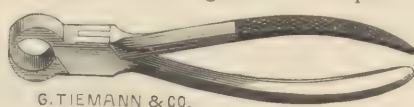


FIG. 1599.—Curved Rongeur.



FIG. 1594.—Liston's Bone Forceps, Large.



FIG. 1595.—Isaac's Bayonet-shaped Bone Forceps.

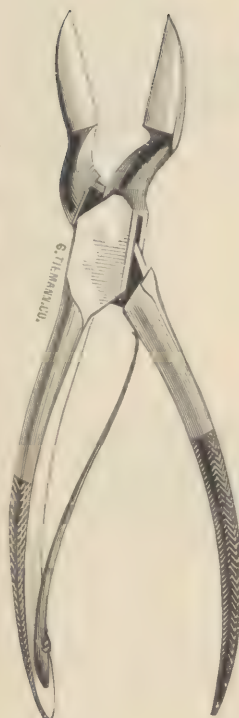


FIG. 1596.—Heuel's Bone Forceps.



FIG. 1597.—Darby's Rongeur and Bone Holder.



FIG. 1598.—Straight Rongeur.



FIG. 1600.—Velpeau's Curved Bone Forceps.



OSTEOTOMY.

FOR RESECTION AND EXSECTION.

FIG. 1601.
Maxillæ Saw, Right.



FIG. 1602.—Goodwillie's Oral Saw.



FIG. 1603.
Maxillæ Saw, Left.



FIG. 1604.—Butcher's Bow Saw, with two Blades.

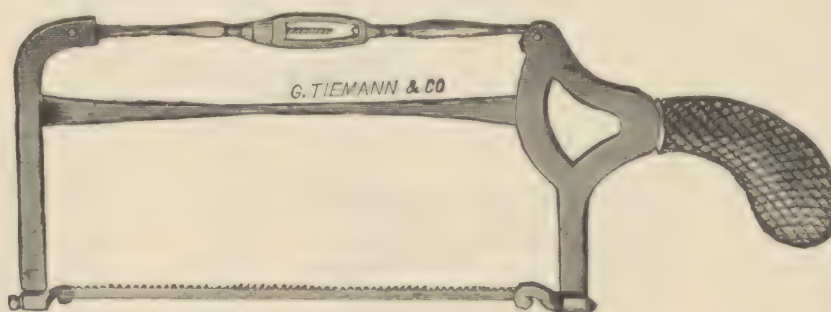
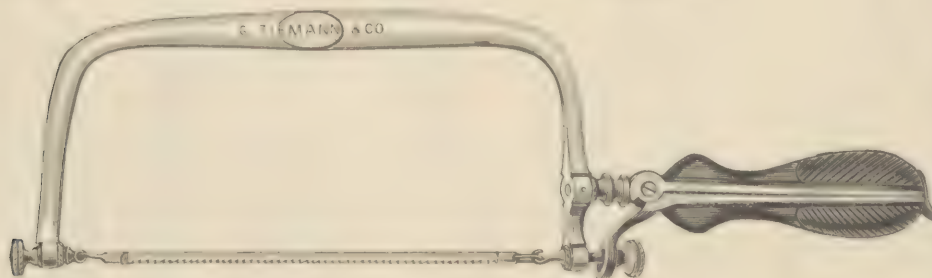


FIG. 1605.—Stohlmann's Rotating Saw.



FIG. 1606.—Szymanowski's Bone Excising Saw, improved by Tiemann & Co.



The blade of any of the above Bow Saws may be taken from its position, and passed under the bone, if required, and the ends, being re-attached in the frame, the bone is as readily divided from beneath as from above; the saw may be turned laterally also, or may be made to cut in a curve, especially with the saw, Fig. 1605, the blade of which is made to rotate at will, the thumb of the hand turning the cogs while sawing. The tension of the saws, Figs. 1604 and 1605, is regulated by a screw; that of Fig. 1606 by a spring in the handle and screw.

OSTEOTOMY.

FOR RESECTION AND EXSECTION.

FIG. 1607.—Heine's Osteotome.

Heine's Osteotome is composed of the articulated saw, the saw-carrier, the case with motive wheel and crank, the adjustable guards, the handle, the hand-rest and meter.

The *saw* is in form of gearing chain; it has, besides the cutting-teeth on the exterior, grooves on the inside corresponding to spurs on the motive wheel.

The *saw-carrier* is a thin knife-like plate (deeply grooved longitudinally), over which, and the motive wheel, the saw is extended. By means of a set screw, the milled head of which is seen in the case in front of the motive wheel, the saw-carrier is made to move; this regulates the tension of the saw.

The *case* is composed of two plates, between which the motive wheel is held. To the axle of this is fitted a crank with ball and socket joint; by this the saw is operated.

The *adjustable saw-guards* are two bars with hooked extremities; they move in frames attached to the saw-carrier, and may be fixed in any desired position by set screws. They are intended to grasp and hold the bone to be sawed, to protect the soft parts, and to guide and approximate the saw to the bone.

The *handle* consists of a plate of steel covered with two concave tortoise shell scales. Underneath the scales is a spring, for the purpose of gradually retracting the guards when the saw is operated.

The *hand-rest*, composed of three articulations and a cross-plate, is fastened on to the left side of the instrument by means of a bolt, and is movable in all directions. The hand-rest and frame of the saw may be likened to the legs of compasses, so that when the point with screw is fixed, the other, with the saw, can be directed to describe any figure on deep-seated bone.

The *meter* is situated on the right side of the instrument. It moves backwards, forwards and laterally, and is for the purpose of predetermining the depth to which the saw shall be permitted to enter when used on the skull.

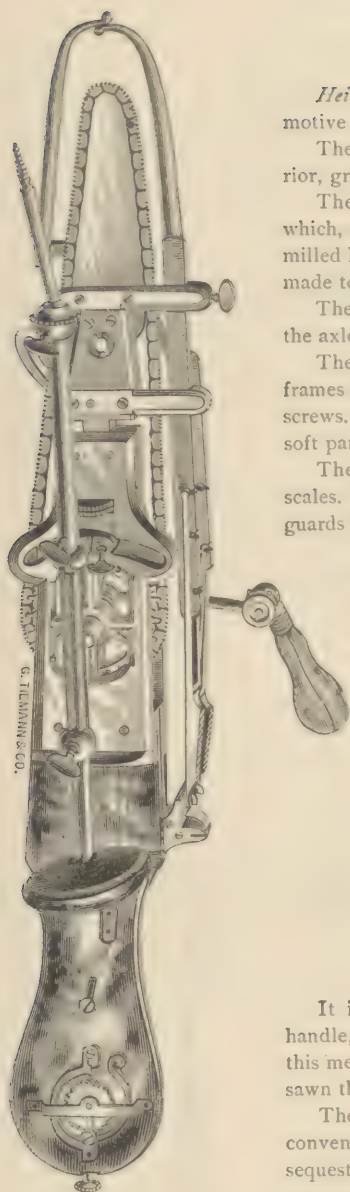


FIG. 1608.—Cowgill's Hey's Saw.

It is so constructed that the blade, instead of being fixed in its position to the handle, works up and down in a slot, which is adjusted by a screw in the handle. By this means the length of the blade can be regulated to the thickness of the bone to be sawn through, making it impossible for the blade to slip through and injure the brain.

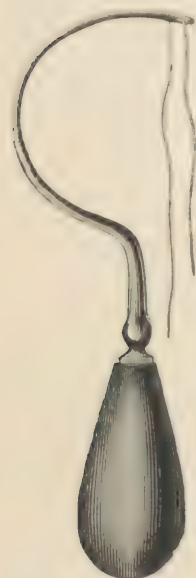
The blade can be lengthened as well as shortened, of course. This makes it a very convenient instrument for working in deep cavities in resection, and also in removing sequestra.



OSTEOTOMY.

FOR RESECTION AND EXSECTION.

FIG. 1609.—Chain Saw.

FIG. 1612.
Chain Saw Carrier.FIG. 1613.
Prince's Retractor and
Chain Saw Carrier.

Bone Exsecting Set.

\$65.60.

- 1 Chain Saw, best.
- 2 Chisels, different sizes.
- 2 Gouges, different sizes.
- 1 Curved Rongeur or Gouge Forceps, with spring.
- 1 pair Liston's Bone Forceps, large.
- 1 set Brainard's Bone Drills.
- 1 Bone Trephine and Handle.
- 1 Elevator and Raspatory.

To use this saw, one end is removed from the hooked handle, *B*, and the needle, *C*, armed with a strong thread, is attached to this end; the needle is passed under the bone, and the saw drawn into position, with the cutting edge upwards, and the handle re-attached. The operator, grasping the handles, draws the saw alternately from side to side until the bone is divided. There is great danger of breaking a chain saw if it be worked carelessly; it should be drawn from side to side steadily, at an angle of 45° to the long axis of the bone.

The handle of this saw is an improvement on the old style. It rotates around the socket, *A*. This socket is made in two halves, held together by a ring. Into one of the halves, depressions, corresponding to a link of the chain saw, are cut, so that if the saw should break during an operation the first sound link may be grasped into this socket, and the operation proceed.

FIG. 1610.—Buck's
Chain Saw ConductorFIG. 1611.—Post's
Ligature and Chain Saw Carrier.

- 1 pair Sequestrum Forceps.
- 1 pair Mott's Retractors.
- 3 Coils Silver Wire.
- 6 Wire Needles, Silk, Iron Wire
- 1 pair Bone Forceps, angular.
- 1 pair Ferguson's Lion-jaw Bone-holding Forceps
- 1 Lead Mallet.
- 1 Metacarpal and Interosseous Saw, narrow.
- 1 Pope's Antrum Drill
- 1 Mahogany Case, lined with oil-dyed velvet.

OSTEOTOMY.

FOR RESECTION AND EXSECTION.

FIG. 1614.—Gowan's Exsector.

(Extract from a description by JOHN A. WYETH, M. D., *Medical Record*, March 29, 1884.)

The handle is hollowed out for the passage of a steel bar, *b*, which runs the entire length of the apparatus to act on the jaw of the forceps. On a portion of its inferior edge, at about its middle, cogs are cut in which the teeth of the lever, *a*, catch, and the degree of pressure of the jaws, *c*, on the bone to be held is regulated by the pressure of the fingers of the operator upon the lever, *a*. The saw, *e*, works into a shield, *d*.

Method of using.—The bone to be exsected having been exposed, with its periosteum peeled off in common with all the circumjacent tissues, the operator, holding the handle of the

instrument in his left hand (the saw being entirely removed), depresses the lever, *a*, draws back the bar, *b*, and opens the jaws, *c*, wide enough to insinuate them upon the bone. As soon as this is accomplished, the bar, *b*, is pushed forward against the heel of the jaw and the lever, *a*, is pressed toward the handle. With the right hand the saw is passed into the shield, *d*, down until the teeth engage against the bone. A slight oscillation of the handle of the saw with the requisite pressure carries it through the bone with remarkable rapidity, and without wounding or bruising the contiguous soft tissues. The shield, *d*, not only rotates, but is reversible, and can be changed from one side to the other.

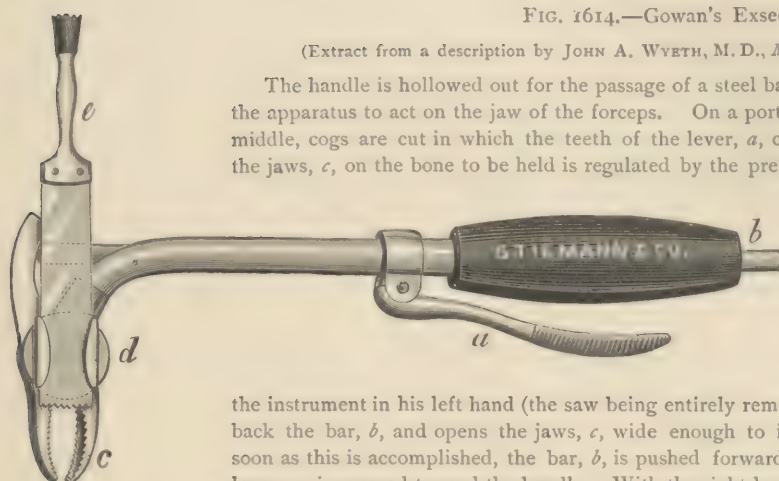


FIG. 1615.—Wyeth's Exsector.

My modification is simpler as to mechanism than Gowan's. I have had constructed a narrower saw and shield, so that it may be used in exsections of small bones closely related to each other, as the metacarpal bones. The handles work with a double-jointed motion, and

have a fixation clamp, *f*, like the Russian needle-holder. By opening or closing the handles, the jaws, *g*, are separated or closed. The action of the rotating shield, *h*, and the saw, *i*, are the same as in Gowan's.

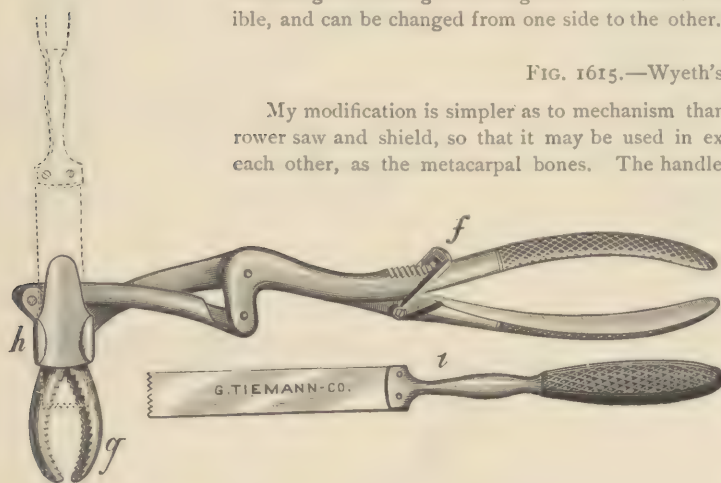
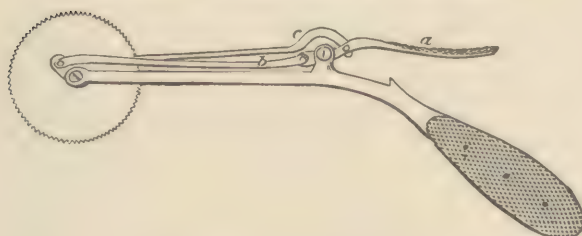


FIG. 1617.—Tiemann & Co.'s Circular Saw.



This saw has two blades that move in opposite ways when the lever is worked; this makes it stay on the spot and cut. A circular saw, with but one blade, will not stay on the place where it is intended to cut, but will run, unless driven with great velocity or provided with fixators.

FIG. 1616.
Stohlmann's Bead Saw (Patent).



The sections consist of metallic beads strung on a wire with handles; it acts in whatever direction it is held.

OSTEOTOMY.

FIG. 1618.—V. Graefe's Circular Saw.

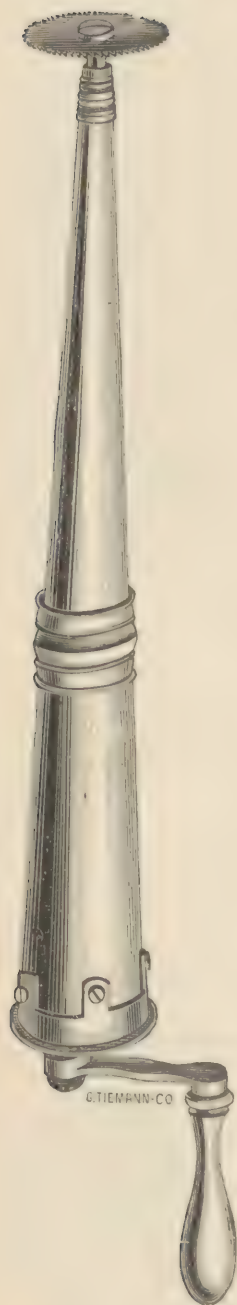
The circular saw is fitted and secured, by means of a screw, to the extremity of a steel rod about sixteen inches long, the other end of which is headed by a wheel gearing. A second wheel, to be turned by means of the crank, also provided with corresponding teeth, is fastened to a short rod. The rods and gearing are concealed by a brass casing, conical as to length, oval in diameter; the small end of the cone serving as a bed in which the long rod moves. An iron plate is soldered into the casing, about half an inch from the larger extremity; this is pierced with two holes which serve as layers for one end of each of the spindles. The broadest extremity of the casing is closed by means of a cap fastened with screws; through this the end of the short spindle projects, to which the crank is fitted.

The crank or motive wheel has seven teeth, the one for the saw spindle twenty-one, so that the crank has to be turned three times to effect one revolution of the saw.

This arrangement can be reversed by exchanging the position of the cogs, so that three revolutions of the saw are obtained by turning the crank once.

The operator has to hold the saw with both hands. It is very difficult to keep applied, it having a tendency to divert from the intended direction.

An assistant must turn the crank.



For Perforating the Mastoid Process.

FIG. 1619.—Buck's Drills.



FIG. 1620.—Post's Rongeur.



FIG. 1621.—Hand Gouge.



FIG. 1622.—Drill with Guard, for Perforating the Mastoid Process.

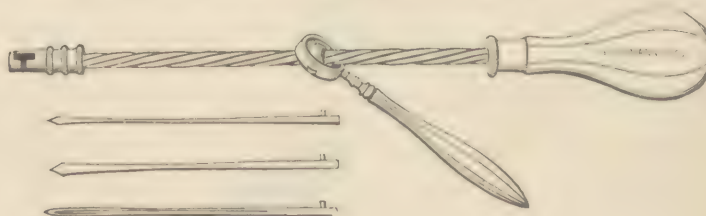
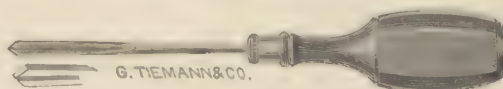


FIG. 1623.—Burnett's Knife, for Mastoid Process.



FIG. 1624.—Drill.



OSTEOTOMY.

DRILLS.

For Un-united and Oblique Fractures, for passing Silver Sutures, clearing out Carious Cavities and letting out Pus.

FIG. 1625.—Brainard's Bone Drills.

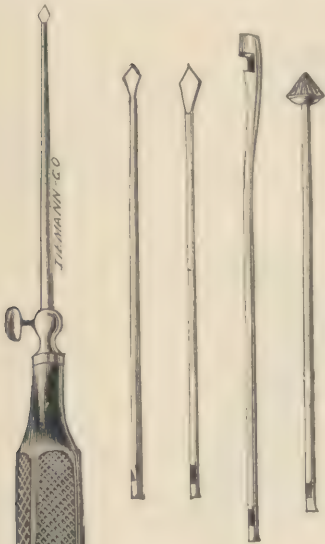


FIG. 1626.—Howard's Bone Drills.



FIG. 1627.—Gaillard's Bone Drill for Un-united and Oblique Fractures.

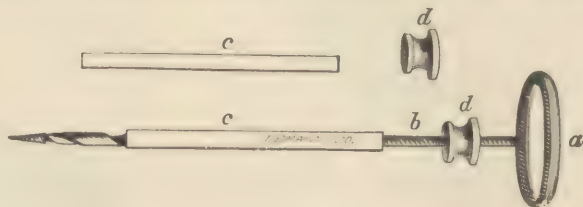


FIG. 1628.—Tiemann & Co.'s Drill Stock.

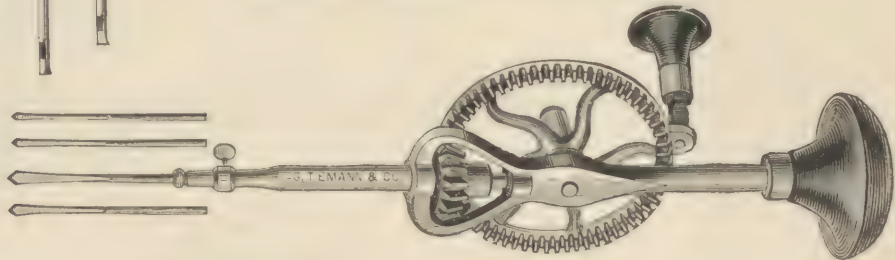


FIG. 1629.—Hamilton's Improved Bone Drills.



FIG. 1630.—Buck's Drills for the Mastoid Process.

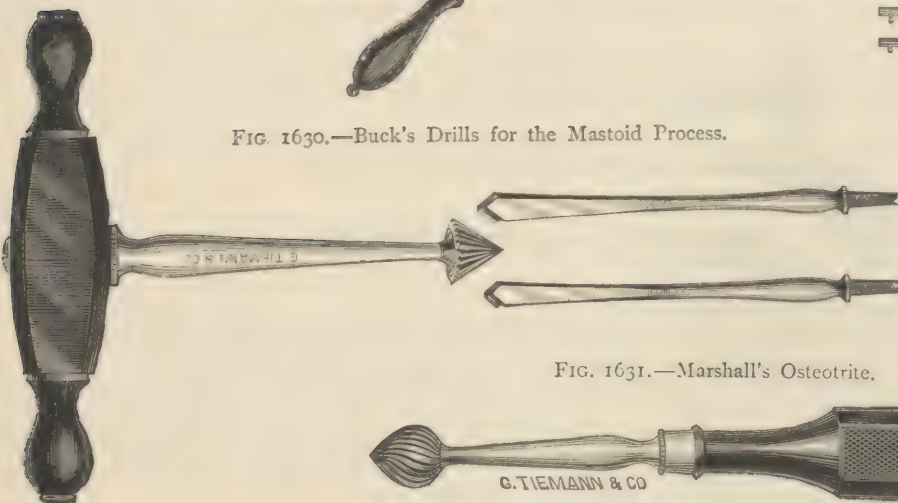


FIG. 1631.—Marshall's Osteotrite.



OSTEOTOMY.

FOR CORRECTION OF DEFORMITIES.

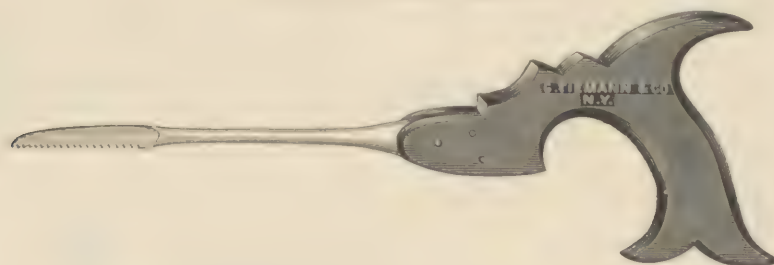
For Subcutaneous Section of the Neck of the Thigh Bone. To rectify Malposition in case of Osseous Anchylosis of the Hip Joint.

FIG. 1632.—Adam's Subcutaneous Section Knife.



It is three-eighths of an inch wide, with a cutting edge one inch and half in length, at the end of a slender shank three inches long. This is for making an incision down to the trochanter major, dividing the muscles and opening the capsular ligament.

FIG. 1633.—Adam's Large Saw.

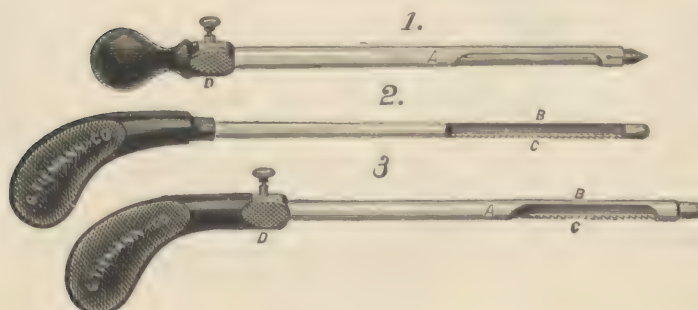


This saw has a large curved handle by which a good hold is obtained. It is three-eighths of an inch wide, with a cutting edge an inch and a half in length, at the end of a slender shank three inches long. The saw has a round, blunt end, in order not to injure the tissues behind the bone. The saw is carried along the track of the knife, and the neck of the bone is then divided.

FIG. 1634.—Adam's Small Saw.



FIG. 1635.—Shrady's Subcutaneous Saw and Knife.



The instrument consists of a trocar and canula, 1, of the same size as the saw. The canula has a fenestra corresponding in position to the teeth of the saw. The trocar and canula are thrust down by the side of the bone to be divided, the instrument being held in such a position that the fenestrated portion of the canula shall rest upon the bone at the point of desired section, the trocar is then withdrawn from the canula and is replaced by the saw, 2. After the bone has been sufficiently divided, both saw and canula, 3, are removed.

OSTEOTOMY.

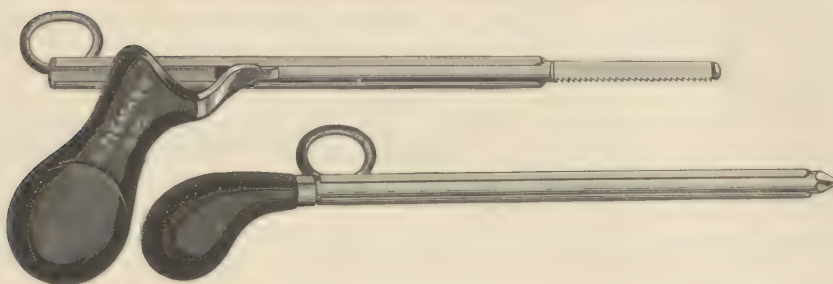
FOR CORRECTION OF DEFORMITIES.

For Subcutaneous Section of the Thigh Bone. To Rectify Malposition in case of Osseous Anchylosis of the Hip Joint.

FIG. 1636.—Shrady's Subcutaneous Section Saw, Angular Handle Canula.



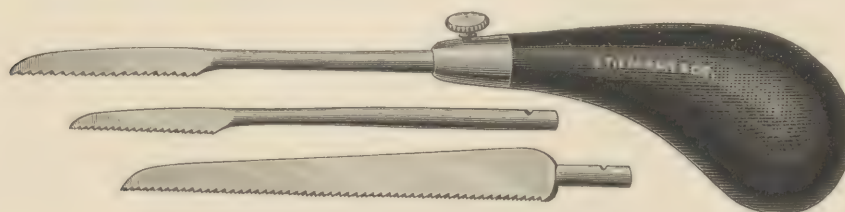
FIG. 1637.—Shrady's Improved Subcutaneous Saw and Knife.



The subcutaneous saw (Fig. 1637) is believed to be an improvement on the one presented by me to the profession some time ago. The principle is essentially the same, but its application as compared with the former instrument much wider and its construction much less complicated. It is now made in three parts: 1, a long, strong, blunt-pointed instrument, with limited saw-edge and fixed handle; 2, a trocar and handle; and 3, a canula or sheath, open on one side throughout its entire length, and made to fit both saw and trocar. The trocar and canula are used as guides for the saw. They are first introduced to the bone to be divided by thrusting them through the skin and intermediate soft parts. The trocar is then withdrawn, and in its place the saw is introduced, guided by the canula. The canula is then in its turn withdrawn, leaving only the saw with its teeth in contact with the bone. The bayonet-bend of the saw near its handle allows the canula or sheath to slide back and forth over the saw-blade and past the deflected handle with the greatest ease. After the saw has done its work, and while it is still in the wound, the canula is slipped over its blade and the latter withdrawn in its turn. Finally, the canula itself is removed, leaving only the wound caused by the original track of trocar and canula.

By these means it will be seen that the introduction and withdrawal of the saw are effected without the possibility of any tearing of the soft parts by the teeth of the saw.

FIG. 1638.—Wyeth's Subcutaneous Section Saws.



OSTEOTOMY.

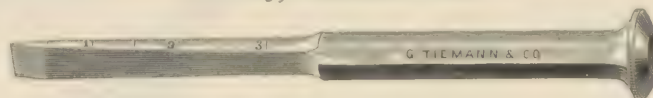
For Correction of Deformities, of Badly United Fractures; for Correcting Malposition of Limbs affected with Osseous Anchylosis and Rachitic Deformities.

Dr. Wm. Macewen ("Osteotomy") says: The instruments used by me are of two different kinds, the chisel and the osteotome. The former being of the same form as the carpenters'—though different in temper, the latter being sharpened like an attenuated double inclined plane.

The chisel is used for paring, shaving and cutting out of bone, such as a cuneiform portion of the tibia in anterior curvature.

The osteotome is used only for making simple incisions or wedge-shaped openings, without removal of bone.

FIG. 1639.—Macewen's Chisel.



The blade of the *chisel* has two parallel sides extending as far as the cutting edge. The cutting surface has one side straight, the other beveled. It ought not to be too thick, otherwise the bone will splinter. For most purposes an eighth of an inch at the base of the bevel is suitable. The breadth of the instrument varies according to the size of the bone. Half an inch broad is found very suitable in the majority of cases; but for narrow fibulæ a quarter of an inch is better. The breadth ought always to be less than that of the bone to be divided, otherwise the soft tissues on either side would be cut. Though the form of the instrument is similar to many employed by the carpenter, yet the temper and quality are quite different. A chisel tempered so as to cut wood, such as a carpenter's, would not be suitable to cut bone. On the other hand, the instrument employed by the iron cutter (dresser) would be equally faulty in thickness and temper. The bone would be apt to turn the edge of the former, while the latter would be apt to splinter it. The nearest approach of the requisite temper will be found in the tools of the hard-wood or ivory turner; but it is best to get the chisel tempered to suit bone, and its quality may be easily tested on the thighbone of an ox. The quality of the steel used, and the exact temper, are the same as required for the osteotome. The edge of the chisel ought to be kept very keen, so as to catch the bone when brought in contact with it, and to take away fine shavings when required. The osseous surface left by a sharp chisel ought to be quite smooth. This instrument is used for cutting a wedge and removing it out of the bone. For the purpose of making a simple osteotomy, or in order to have a wedge-shaped opening in the bone, without removal of any osseous substance, an *osteotome* is employed.

FIG. 1640.—Macewen's Osteotome.



The osteotome is an instrument of the chisel order, bevelled on both sides, so as to resemble a very slender wedge. The handle and blade form one piece. The handle is octagonal, which is preferable to the oval or cylindrical, as it affords a better grip, and enables the operator to readily detect any deviation which the instrument might assume while in the wound. The top of the instrument is furnished with a round projecting head, against which the thumb of the operator rests as he steadies the instrument; it also serves as a support whereby the osteotome may be gently levered out of the section.

One of the borders of the blade is marked with half inches, the figures being extremely delicate. The thickness of the bone can be ascertained in many cases, and thus the distance to be penetrated can be predetermined. The figures on the border of the instrument indicate the depth to which it has penetrated, and thus they serve as a guide. It is finely polished—not for appearance, but because the finer the surface the less opportunity will organic matter have of becoming adherent and of afterwards decomposing.

It has sharp cutting edges, which grip the bone when they are pressed in contact with it. The sharpness may be tested by seeing whether they will easily pare the finger-nail. The attenuated double-inclined plane has its apex at the cutting edge and its base where the blade joins the handle.

The instrument ought to be made to suit the material upon which it is to act, not only in respect to its form, but also to its temper and the "stuff" of which it is made. It ought to be made of very fine steel, tempered so as to prevent brittleness or too great softness. If it is brittle it may snap and leave a portion of the metal in the tissues; if too soft it will curl and turn up on the edge.

They are best made from Stubb's finest steel, $\frac{5}{8}$, forged at a low heat; tempered by raising the instrument to a cherry-red heat, dipping it into oil, and then plunging it into water until cold; next polished, and about an inch of the chisel, measuring from its cutting edge, having its temper drawn back to a copper yellow color with purple spots: so

OSTEOTOMY.

FOR CORRECTION OF DEFORMITIES.

that only a small portion of the blade, embracing its cutting edge, is raised to a great degree of hardness, the remainder of the blade is comparatively soft, so as to avoid the possibility of snapping. Though this particular is applicable to all osteotomes, it is especially so to the most slender of them, when used where the bone is thick and the instrument has to be deeply inserted. A good material for testing the instrument is the "hough" bone of an ox. If one finds that the instrument will neither turn nor chip in penetrating such a bone, it may be concluded that it is well suited for cutting any human bone.

Macewen employs the term osteotome to this instrument in order to distinguish it from the ordinary chisel. The instrument maker will be obliged to term it "Macewen's Osteotome," to further distinguish it from other instruments known by the same appellation.

The set of instruments are made as nearly of the same weight as possible, so that the hand, accustomed to the sensations communicated through one of these instruments, may not be thrown out of reckoning by having a heavier or a lighter instrument turn by turn. Even the chisel is made of the same weight for similar reasons. It is also of some moment to use the small mallet, as the impelling force may then be nicely balanced. Being all in one highly-polished piece, with few or no crevices in which foreign matter may lodge and decompose, these instruments are easily cleaned and the surgeon ought himself to see that they are clean, as scrupulous cleanliness is a very important element of success. If they are not clean before being used, they will probably clean themselves in the wound, leaving in the soft parts or on the osseous tissue the foreign substances, and so probably inoculate the tissues with decomposing matter.

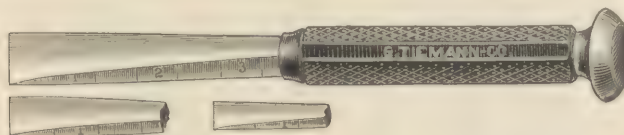
FIG. 1641.—Rawhide Mallet.



The mallet used by Dr. Macewen is of hard wood (*lignum vitæ*) with a hard wood handle, and the only other instruments, an ordinary sharp-pointed scalpel, suitable for penetrating at once to the bone, and a couple of blunt hooks which ought to be used very gently and sparingly.

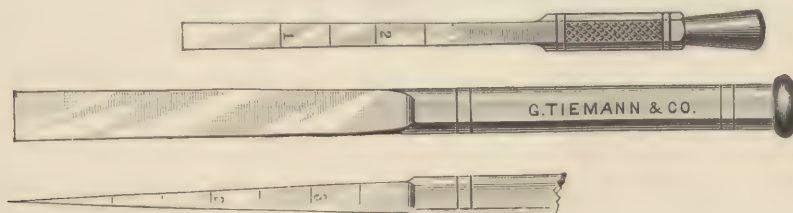
The mallet of rawhide is a more durable instrument than the one of *lignum vitæ*.

FIG. 1642.—Hutchison's Osteotome.



Dr. Hutchison says: "For the purpose of protecting the hands from the irritating effects of carbolic acid spray I cover them with carbolic vasaline, one part to ten, this makes the hands slippery and the hold upon the handle of Macewen's osteotome and chisel uncertain. In order to obviate this I now have their handles covered with hard rubber, which is baked on and creased in various directions."

FIG. 1643.—Poore's Osteotomes.



Dr. Poore's osteotomes are longer in the handle and not quite so heavy in the blades as Macewen's. The Doctor describes them in his work, "Osteotomy and Osteoclasts:" "* * * The cutting edge should be very sharp. It should be marked on the flat surface every half-inch from the edge, in order that the distance that the instrument has penetrated the bone may be known. A large handle is also of advantage, as it can be grasped more easily. The best width is half an inch. It is well to be provided with three osteotomes of the same width, but of different thick-

OSTEOTOMY.

FOR CORRECTION OF DEFORMITIES.

ness, in order that, if the largest gets wedged, it may be withdrawn and replaced by the next smaller—to be again replaced by the third if it be found necessary.

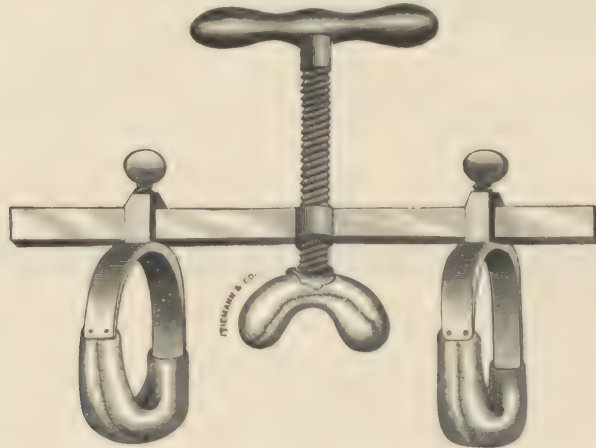
"I also have an osteotome of the same shape, but only one-quarter of an inch wide, for section of the fibula or any small bone. Most of the osteotomes found in instrument stores are not made properly. They have a bulge just above the cutting edge, like a post-mortem chisel. In some trials made upon the cadaver with such an instrument, it was found that the bone was invariably splintered at right angles to the line of desired section, the fracture extending several inches above or below the instrument. This was due to the thickness of the chisel, just above its cutting edge, acting too much like a wedge. An instrument properly made can be driven into the bone without turning from its direction. The mallet should be made heavier than those placed in necrosis cases. The chisel for performing a cuneiform osteotomy should be shaped much like a carpenter's; half an inch in width is sufficient. The beveled portion should not be too large."

OSTEOCLASIS.

For Correction of Deformities after Fractures; for Straightening Anchylosed Joints; for the Correction of Rachitic Deformities.

The object of osteoclasis is to produce a simple fracture and then to keep the limb in a fixed bandage, in a corrected position, until firm union has been established.

FIG. 1644.—Rizzoli's Osteoclast.



Osteoclasis, by means of an apparatus by which considerable power can be applied, has been advocated by all writers upon surgery, and many instruments have been devised for this purpose. The earlier operations were restricted to the correction of fractures of the long bone united at an angle, but later surgeons have extended the operation to deformities of the limbs due to other causes. Bush, Louvier, Maisonneuve, and others, have invented instruments for this purpose. In 1846 Rizzoli devised the osteoclast, which is figured above, with the modification of Dr. Poore, who has had three threads cut upon the upright bar which forms the screw, in order to increase the rapidity with which the force can be applied.

It consists of a heavy bar, fifteen inches long, one inch wide and three-eighths of an inch thick; being much thicker in the centre, which is pierced for the female portion of a screw. Into this is fitted a round steel bar, one-half an inch in diameter, on which is cut a thread corresponding to the nut on the long bar, and furnished at its upper portion with a handle; at its lower extremity is a strong, well-padded steel plate or crutch, forming a segment of a circle. The portion of steel forming the male part of the screw turns in a socket on the upper side of this crutch. Two steel rings, five inches in diameter, one inch wide and one-fourth of an inch thick, having at their upper portion a slot into which the large bar slides, and to which they are fixed in any desired position by binding screws. The lower segments of these rings are well padded with flannel and covered with chamois.

PHLEBOTOMY.

FIG. 1645.—Spear-pointed Thumb Lancet.



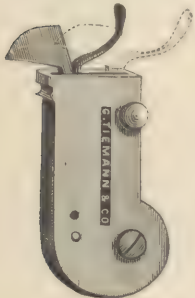
FIG. 1647.
Tiemann & Co.'s
Spring Lancet.



FIG. 1646.—Broad-pointed Thumb Lancet.



FIG. 1648.
Button Trigger
Spring Lancet.



CUPPING.

FIG. 1650.—Tiemann & Co.'s Patent Scarificator.



FIG. 1649.
Plain Spring Lancet.



FIG. 1653.
Tiemann & Co.'s Soft
Rubber Cupping Cup.



FIG. 1651.
Ten-Bladed Scarificator.

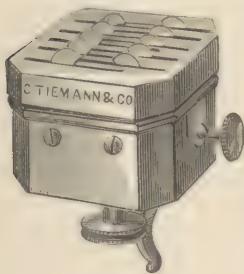


FIG. 1652.
Twelve-Bladed Scarificator.

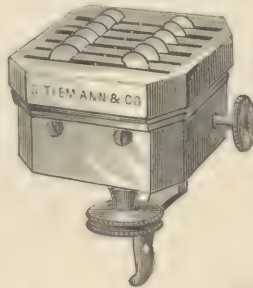
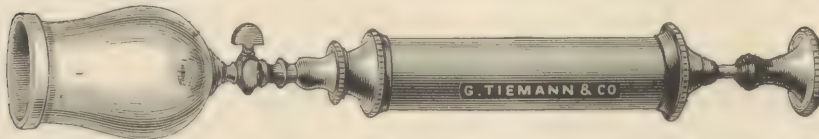


FIG. 1654.
Glass and Rubber
Cup.



FIG. 1655.—Cupping Pump, Stop-cock and Cup.



No. 1 Cupping Set.

\$13.

Contains :

- 1 Brass Cupping Pump.
- 3 Stop-cocks.
- 3 Glass Cups.
- 1 Ten-bladed Scarificator.
- 1 Mahogany or Black-walnut Case, lined with velvet.

No. 1. Without Scarificator.... \$9.00

Also, Breast Pumps.

No. 2 Cupping Set.

\$15.

Contains :

- 1 Brass Cupping Pump.
- 3 Stop-cocks.
- 6 Glass Cups.
- 1 Twelve-bladed Scarificator.
- 1 Mahogany or Black-walnut Case, lined with velvet.

No. 2. Without Scarificator.... \$10.50

DRY CUPPING.

FIG. 1656.—Junod's Boot.



Dry cupping was suggested about thirty-five years ago by Junod, of Paris, for the relief of rheumatic pains, paralysis, and atrophy of the muscles. It is an excellent counter-irritant, producing no painful sores, and is frequently more effective than blisters.

It increases the circulation when, from any cause, there has been an obstruction—thus aiding and assisting nature in her efforts to convey a healthy current of blood to the different parts of the system.

Fig. 1656 represents a metallic receiver for the leg with a rubber band on the upper border, which, when fastened to the leg by a strap and buckle, renders the boot air-tight.

In front of the boot is a stop-cock; this has a rubber tube attached, connecting it to an air pump, which, when worked, exhausts all the air from the boot.

Fig. 1657 represents Junod's Arm, which is analogous to the boot and will readily be understood by the drawing.

Cups for other parts of the body adapted to order.

FIG. 1657.
Junod's Arm.

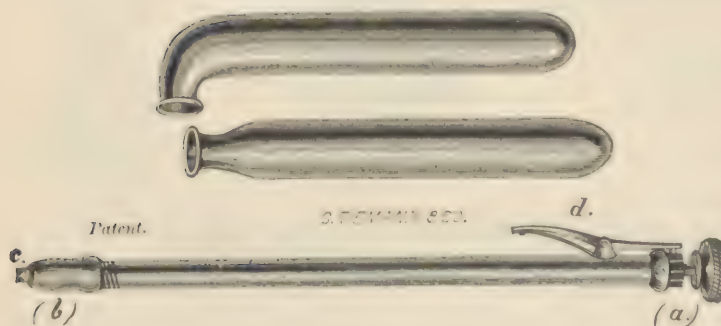
FIG. 1658.—Thomas' Dry Cupper.



Dr. Thomas, on "Diseases of Women," says: "The cervix uteri may, by the application of an exhaustor or dry cup, have a marked hyperemia excited within it, which extends to the uterine body and replaces that which should have occurred from physiological causes. A very simple method for producing it is to enclose the cervix within the mouth of the cylinder of hard rubber represented in Fig. 1658, and then to exhaust the air by withdrawing the piston. Before the introduction of this instrument the uterus should be exposed by means of the speculum.

LEECHING.

FIG. 1659.—Tiemann & Co.'s Patent Artificial Leech.



The principal feature is the employment of light glass tubes, from which the air is expelled by the vapor of ether, and which imitate very closely the suction of the natural leech as the vapor within them condenses.

To expel the air from a tube, a few drops of ether are poured into it, and it is then immersed as far as the mouth in hot water until the ether boils briskly. The mouth of the tube is then applied to the skin, and held for an instant, when it will be found to be firmly attached and can be left to itself. Each

tube will draw about two drachms of blood. For uterine practice they are made long enough to be applied through a speculum.

The scarifier is simply a tube one-eighth of an inch in diameter, straight or curved, having a cutting edge at one extremity. By a simple device this is made to rotate rapidly, making, when applied to the skin, a circular incision, the depth of which is regulated by a gauge.

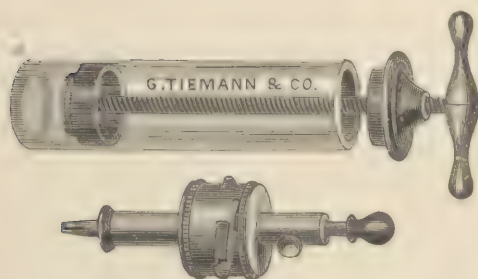
In the cut, *a* represents the button, by turning which the instrument is wound up; *d*, the trigger, by which the spring is released; *c*, the cutting edge, and *b*, the gauge for regulating the depth of the incision.

The tubes for general use have the mouth on the side, but some are made straight, as more convenient of application in certain cases.

LEECHING.

FIG. 1660.—Heurteloup's Artificial Leech.

One Glass Pump and Cutter, contained in a neat Morocco Case, \$8.

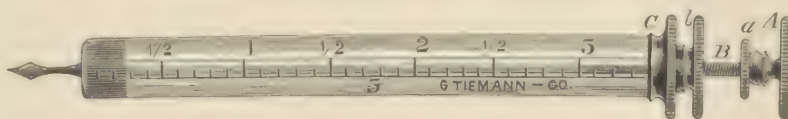


The instrument is of great service in the abstraction of blood in deep-seated intra ocular diseases, &c.

The scarifier has a circular cutter, passing through the centre of the shaft; the depth of the cut is regulated and set by a thumb-screw. The motive power is a watch spring, which after having been wound up, is set off by a trigger. After making the incision the blood is drawn by the pump, consisting of a glass barrel and a piston, with a screw arrangement to fix it when drawn up. The glass cylinder, which holds about one ounce of blood, should be filled in from three to four minutes. The piston should be soaked in warm water previous to the operation, so that it may swell up and fit the tube tightly,

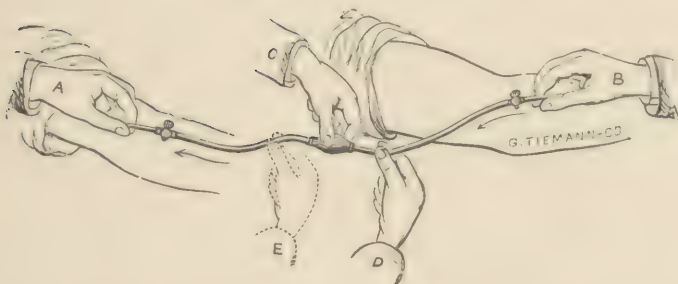
and the edge of the latter, which is applied to the skin, should be greased or soaped, in order that it may fit closely to the skin and prevent the entrance of air.

FIG. 1661.—Reese's Uterine Leech.



TRANSFUSION.

FIG. 1662.—Aveling's Apparatus for Immediate Transfusion.



Mode of Operation.—First place the apparatus in a basin of tepid water, and, while completely under the water, to fill it and ensure its cleanliness, compress the bulb until the air is expelled.

The patient having been brought to the side of the bed, and the arm bared, a fold of skin over a vein, at the bend of the arm, should be raised, transfixed and divided. The flattened vein now brought into view, should be seized with a pair of fine forceps, raised while an incision is

made in it, and the bevel-pointed silver tube inserted. In taking this tube out of the basin, it should be kept full of water, by placing the tip of the thumb over its larger opening. While the operator is doing this an assistant should prepare the arm of the blood-donor, as in ordinary bleeding, making an incision direct into the vein, and passing the round-pointed tube into it, with its point toward the fingers. This person should then be brought to the bedside of the patient, and seated in a chair. It is better not to secure the tubes in the veins by ligatures. *B* represents the hand of an assistant holding the efferent tube and the lips of the small wound together, and *A* shows the afferent tube secured in the same manner. The india-rubber portion of the apparatus, filled with water, and kept so by turning the cock at each end of it, is now fitted into the two tubes. The cocks are then turned straight, and the operation commenced by compressing the india-rubber tube on the efferent side, *D*, and squeezing the bulb *C*; this forces two drachms of water into the afferent vein. Next shift the hand *D* to *E*, and compress the tube on the afferent side, then allow the tube to expand slowly, when blood will be drawn into it from the efferent vein. By repeating this process any quantity of blood can, at any rate, be transmitted, the amount being measured by counting the number of times the bulb is emptied.

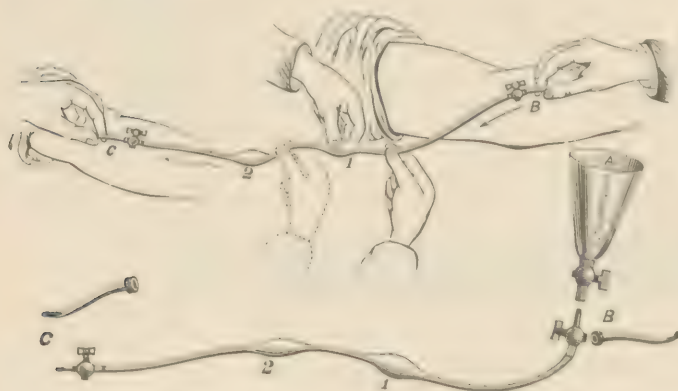
The advantages of this method of transfusing blood are:

- 1st. The chances of coagulation are small, because the blood is removed from the action of the living vessels for only a few seconds, and glides smoothly through the india-rubber pipe without being exposed to the air.
- 2d. The apparatus is effective, simple, portable, inexpensive and not likely to get out of order.
- 3d. The operation is safe, easy, uninterrupted, and a close imitation of nature.

TRANSFUSION.

FIG. 1663.—Fryer's Transfusion Apparatus.

The instruments for transfusion are, as is well known, quite numerous, and while many of them are very good, we believe that of Aveling, for immediate transfusion, to be probably the simplest, safest, and most easy of application. We have lately modified it by adding another bulb to the tube, and by having both tube and bulbs cast of the rubber into one piece. By the additional bulb we can save time in doing the operation, and can keep the blood moving along the tube almost continuously. In having the tube and bulbs in one, we do away with the metal portion which couples them in Aveling's apparatus, and we thereby diminish the risk of blood lodging and coagulating; while we can, if necessary, compress the whole apparatus more completely. As in Aveling's instrument, there are no valves. The inner wall of the whole apparatus is perfectly smooth, and we have had the opening from tube to bulbs made a gradual slope, thus altogether doing away with corners in which the blood might be arrested and form a clot.

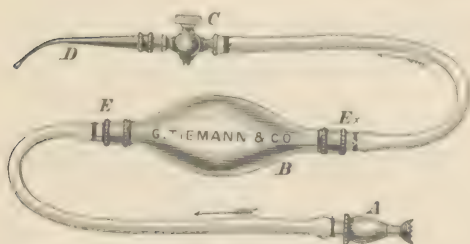


The manner of using the instrument is very similar to Aveling's. The canula marked *B* is placed in the giver's vein, that marked *C* in the vein of the receiver. The tube and bulbs having been filled with warm water, or better with Mr. Little's saline solution (also warm), are now adjusted to the canulae and the blood allowed to flow into the apparatus. The canula being steadied by an assistant, the tube is to be nipped tightly between the fingers, close to the giver's or efferent end, and then the bulb marked 1 is to be compressed, and the blood of course forced on towards the receiver. While this bulb is still held compressed, the tube at the giver's side

is to be relaxed, and that portion of it between the bulbs is to be nipped; bulb 1 is relaxed, and No. 2 compressed and held; then the tube at the receiver's side is to be seized and held to prevent regurgitation, and the whole apparatus allowed to refill. The same operation to be repeated till sufficient blood is transfused. As suggested by Dr. Aveling, a few drops of ammonia solution may be injected into the bulbs now and then, by a fine-pointed hypodermic syringe, in order to more effectually prevent coagulation. It will be found that considerable force is necessary in sending blood or other fluids into the veins. This we discovered while doing transfusion twice in a case after hæmorrhage from gunshot injury, and we have also found it in our experiments on the lower animals. It is a fact that we have not seen noted in connection with transfusion, and one worth remembering.

In order to use the apparatus as a mediate transfuser, the vessel marked *A* in the cut receives the blood, the tube is to be applied, and the instrument used as before directed. If the blood is not defibrinated and strained, three or four drops of ammonia solution to each ounce is added, in order to avoid coagulation.

FIG. 1664.—Garrigue's Transfusion Apparatus.



Draw eight or ten ounces of blood from a healthy person into a clean vessel, whilst it is accumulating whip it with a silver fork, a stick of wood or a bunch of straw, then strain it through a piece of cleanly washed linen into a vessel placed within another containing warm water (about 105 C.) Warm the syringe, put the suction end *A* into the blood, compress the bulb, and when it flows through the canula, turn the stopcock *C*.

Having bared the patient's arm, raise a fold of skin over a vein at the bend of the elbow, divide it and pass a probe or thread under the vein thus brought into view. This is now held with a pair of forceps or tenaculum and an incision made with a

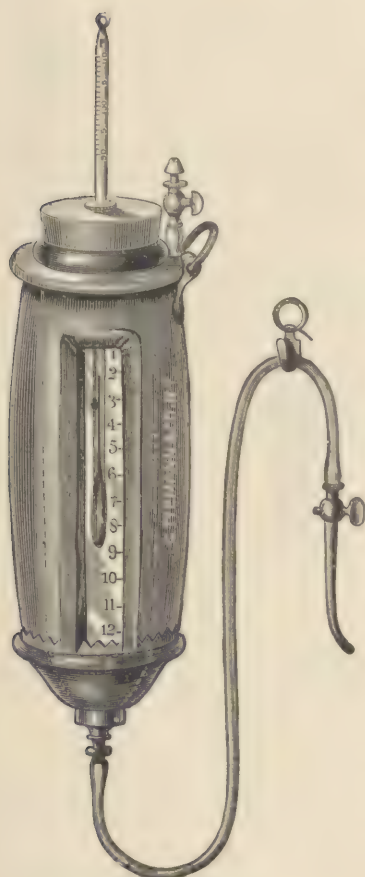
lancet or pair of fine-pointed scissors, carefully avoiding to wound its posterior wall. Now introduce the canula *D*, open the stopcock and inject slowly.

The bulb contains about three fluid drachms, but by moderate compression about two only are expelled. In most cases it suffices to inject from four to six ounces. If resistance not due to external pressure be felt, or dyspnoea, or any other untoward symptom appear, the operation has to be interrupted or ended. Dress the wound as after phlebotomy.

After use, the instrument must be thoroughly cleansed, which is best done by separating all the parts and washing them in warm water.

TRANSFUSION.

FIG. 1665.—Hutchison's Transfusion Apparatus.



The apparatus consists of a cylindrical glass receiver, graduated in inches, ten and three-quarter inches long and three-quarters of an inch in diameter, of a capacity of twelve ounces; or it may be made larger if desirable. A metal cap is attached to its lower end, with a perforated nipple-shaped termination, to which a rubber tube four feet long is attached, in order to convey the liquid from the receiver to the canula which enters the blood vessel. The mouth of the receiver is closed by a rubber stopper, which prevents the escape of heat, and is perforated in the centre to admit a thermometer, which fits the opening tightly. The canula has a nipple-shaped end, which is slipped into the distal end of the rubber tube, and is furnished with a stop-cock. The receiver is surrounded by double jacket of india rubber, the walls of which are separated by a half inch space for holding hot water. The water is introduced into the jacket through a tube projecting from the top, fitted with a nipple stop-cock end. An opening at the top of the jacket admits the receiver, and a smaller one at the bottom allows the metal cap to protrude; it has also a narrow opening, extending two-thirds of its length, to allow the operator to see the graduated marks on the receiver, and a loop at the top for suspending the apparatus when in use.

Method of Using the Apparatus.—Drop the end of the rubber tube, to which the nipple belonging to the lower end of the receiver has been attached, into a vessel of hot water (150 to 200° F.) placed three or four feet above the patient, and attach the other end of the tube to the stop-cock at the top of the jacket, the receiver having been previously put inside the jacket, because it cannot be introduced after the jacket has been filled. Now compress the jacket with the hands to expel the air, which will be seen to rise in bubbles through the water; then reverse the compression, and, placing the jacket lower than the surface of the water, a syphon is established, which fills it almost immediately. The jacket when distended holds ten ounces and hugs the receiver closely. This method of filling the jacket is most convenient and rapid, and a larger amount of water can be introduced than by pouring in the opening at the top.

The rubber tube is now attached to the lower end of the receiver, and both are warmed by filling them with hot water, which is allowed to run off before they are filled with the fluid to be injected. The receiver is closed with the rubber stopper carrying the thermometer, and the apparatus is suspended, or held by an assistant, three or four feet above the vein which is to be opened. The vein is to be exposed by lifting a fold of skin transversely across it and dividing it with scissors or a bistoury, making the incision about three-fourths of an inch long. A probe is carried behind the vein; it is then picked up with forceps and opened, by a V incision, with a delicate pair of scissors. Before doing this, the stop-cock of the canula should be opened and a small quantity of fluid allowed to escape, for the purpose of carrying off bubbles of air which may have adhered to the walls of the tube. After the canula is introduced, it is fixed in position by the finger laid over the opening in the vein; no ligature is necessary to retain it in position.

A vein at the bend of the arm is usually selected for the operation, a bandage having been previously applied above the elbow, as in phlebotomy, to distend the veins; but where there is difficulty of finding a vein in this locality, a saphena near the outer ankle may be selected, or the fluid may be introduced into the radial artery. The central end should be selected, as recommended by Hueter and recently practiced by Halstead.*

Transfusion of blood from the veins of one person into those of another is imperatively demanded when a patient is rapidly sinking from hæmorrhage, whether the result of disease, accident or operation. It has hitherto been more particularly employed in profuse and exhausting flooding, and there are many cases on record where it was thus instrumental in saving life. In such an event it is the last recourse of the obstetrician, and no one should hesitate to perform it, even although the woman should literally be in the act of dying, or when, to borrow the language of an eminent writer, "the vital spirit is fluttering with tremulous delay upon the lips."—"System of Surgery," Gross. Vol. I., p. 457. 1882.

* See *Medical Record*, January 5, 1884.

VACCINATING.

FIG. 1666.—Vaccinating Lancet.



FIG. 1667.—Dawson's Vaccinator.



FIG. 1668.—Carroll's Vaccinator.

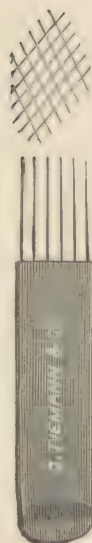


FIG. 1669.—Teller's Vaccinator.



FIG. 1670.—Weir's Vaccinating Lancet and Comb.



FIG. 1671.—Wier's Vaccinating Lancet.



FIG. 1672.—Tiemann & Co.'s Vaccinating Trocar.



FIG. 1673.—Tiemann & Co.'s Vaccinating Scarificator.



DERMIC.

FIG. 1674.
Piffard's Comedone Extractor.FIG. 1675.—Piffard's Acne Lancet and
Comedone Extractor.FIG. 1676.
Hess' Glass Pleximeter.
For observing the skin under
pressure.

FIG. 1677.—Skin Grafting Scissors.



FIG. 1678.—Piffard's Grappling Forceps.



FIG. 1679.—Piffard's Scarifying Spud.

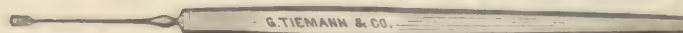


FIG. 1680.—Piffard's Milium Needle.

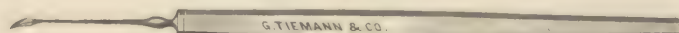


FIG. 1681.—Piffard's Cutisector.



DERMIC.

FIG. 1682.—Auspitz's Scoop.



FIG. 1683.—Henry's Depilating Forceps.



FIG. 1685.—Piffard's Epilating Forceps.



FIG. 1684.—Piffard's Tattooing Instrument, for treatment of wine marks.



FIG. 1686.—Piffard's Irido-Platinum Needle.



FIG. 1687.—Duhring's Galvano-Depilator.



FIG. 1688.—Fox's Needle, for Removing Superfluous Hair by Electrolysis.

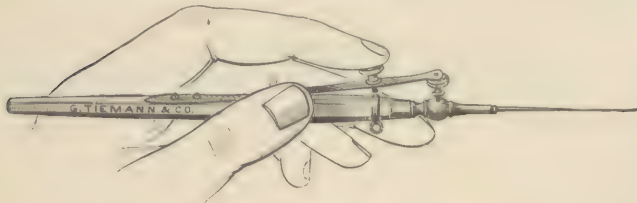


FIG. 1689.—Sherwell's Cutipuncture.



FIG. 1690.—Naevus Needle.



FIG. 1691.—Piffard's Sharp Spoon, or Dermal Curette.



SKIN GRAFTING.

Professor Frank H. Hamilton published an account of an operation, entitled "Old Ulcers Treated by Skin Grafting," in the *New York Journal of Medicine* for 1854. His patient had a large wound, caused by a fall of a heavy stone some fifteen months previously, and attended by so much loss of skin as to render nature unable to effect a cure. To cover this gap Hamilton transplanted a portion of integument from the opposite limb, not sufficient, however, to cover the whole surface. In three months the cicatrization was complete, the new piece of skin having grown from its periphery in every direction, and in the end acquired nearly twice the original size. By this operation, which foreshadowed the whole principle involved in skin-grafting, the New York surgeon hoped to establish, as he expressed it, "a new centre of life on an oasis, from whose outer verge a true and healthy vegetation shall advance in every direction over the exhausted soil."—"System of Surgery," Gross. Vol. I., p. 447. 1882.

To a French surgeon, Dr. J. L. Reverdin of Paris, is given the credit of generalizing skin-grafting by taking minute pieces from healthy parts of the body and transplanting them to large ulcerated surfaces. He called attention to it in 1869.

DERMIC.

COUNTER IRRITATION.

MARTIN'S RUBBER BANDAGES, for the treatment of Ulcers, Eczema, Varicose Veins, &c.	page 74
MICROSCOPIC INSTRUMENTS	" 12
GALVANO-CAUTERY INSTRUMENTS	" 37
THERMO-CAUTERY INSTRUMENTS	" 39
ACTUAL CAUTERY	" 39
DRY CUPPING	" 116

FIG. 1692.—Lente's Platina Cup, for Smelting Caustic.



FINE SCALPELS	page 84
SETON NEEDLE	" 87
ELECTRICITY	" 23
REVULSOR	" 40

FIG. 1693.—Baunscheidt's Lebenswecker. Baunscheidt's Oil.



The needles of this instrument are connected to a spiral spring concealed in the case; they are propelled by drawing the spring back with the right hand, whilst holding the instrument applied with the left, then suddenly letting it go. After this a drop or two of the oil is applied.

FOR MERCURIAL FUMIGATIONS.



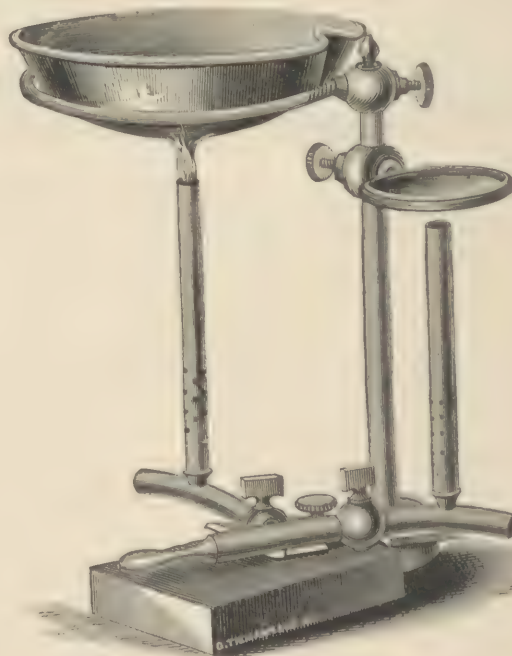
FIG. 1695.—Lee's Lamp, modified by Bumstead.



FIG. 1694.—Van Buren's Lamp.

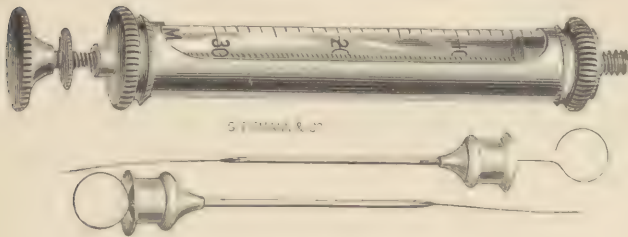
The patient, completely stripped and surrounded by a cloak of gum cloth or a blanket, is seated on a cane chair, beneath which the fumigating apparatus is placed.

FIG. 1696.—Maury's Apparatus.



HYPODERMIC.

FIG. 1697.—Hypodermic Syringe. No. 0.



Nickel-plated, in a neat Morocco Case, \$3.

Has a graduated glass barrel, fenestrated metal guard, 2 steel needles, attachable by screw or slide, a G. T. & Co.'s patent vial and wires for cleaning the needles.

FIG. 1698.—Hypodermic Syringe. No. 1.



Nickel-plated, in a fine Morocco Case, \$4.

Graduated glass barrel, bi-fenestrated metal guard; 2 needles, attachable by a slide or screw, made of tempered cast steel, nickel-plated and much finer than those usually employed—an advantage in lessening pain on the introduction of the same; G. T. Co.'s patent vial and wires.

FIG. 1699.—Hypodermic Syringe. No. 2.



In a neat Morocco Case, \$3.

Hard rubber barrel, graduated piston, 2 steel nickel-plated needles, attachable by screw or slide, with vial and wires for cleaning the needles.

FIG. 1700.—Hypodermic Syringe. No. 3.



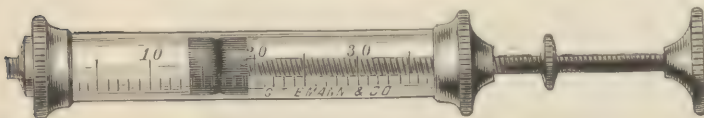
In a neat Morocco Case, \$2.50.

Graduated piston, glass barrel, 2 steel nickel-plated needles attachable by screw or slide, with vial and wires for cleaning the needles.

Hypodermic Syringe. No. 4. In a neat Morocco Case, \$2.50.

Graduated glass barrel, smooth piston rod, 2 fine steel nickel-plated needles attachable by screw or slide, with vial and wires for cleaning the needles.

FIG. 1701.—Hypodermic Syringe. No. 5.



In a neat Morocco Case, \$3.

Graduated glass barrel, 2 fine steel nickel-plated needles, attachable by screw or slide, with vial and wires for cleaning the needles.

FIG. 1702.—Stimson's Hypodermic Syringe. No. 6.



The accompanying cut represents a convenient form of hypodermic syringe to be carried in the pocket case. The point, inclosing the wire cleaner, fits into a hollow graduated piston. The barrel is an ordinary silver tube, the size of a Number 10 catheter, and is about three inches long.

Price, \$3.

Hypodermic Syringe. No. 9. In Morocco Case, \$3.

Metal barrel of true bore, seamless, nickel plated, graduated on piston-rod, 2 steel needles and patent vial.

HYPODERMIC.



FIG. 1703.—Geo. Tiemann & Co.'s Hypodermic Syringe. No. 10.

Price, \$5.

Contains in a metal, nickel-plated, spring top, *seamless* case :

Hypodermic syringe, double fenestrated guard and graduated glass barrel ; 2 hypodermic points, best tempered cast steel, nickel-plated and much finer than those usually sold ; 1 vial with rubber stopper.

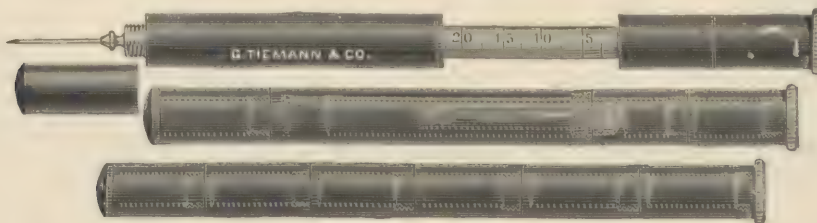
FIG. 1704.—Tyndale's Intra-Pulmonary Syringe.



Tyndale's syringe is made to hold forty-five minims, and is used for both intrapulmonary and hypodermic injection of antiseptics, the packing being of a kind not readily affected by them. Curved finger bearings are attached to the syringe. The hypodermic needles are of ordinary size and calibre used for the injection of antiseptics into the abdominal wall and thighs.

For intrapulmonary injection, puncture through the thoracic walls direct : the needle used is two and three-quarter inches (seven centimetres) in length, stronger and with a somewhat larger bore than the ordinary hypodermic needle.

FIG. 1705.—Nunn's Hypodermic Syringe and Pellet Holder.



Greene's Hypodermic Case. Price, \$10.

It contains four four-drachm vials, and five two-drachm vials, which each physician can fill to suit his fancy or requirements ; a double fenestrated hypodermic syringe and three points or needles, all of the most improved pattern. They are of different sizes : one, the smallest and most delicate ever manufactured : another, a size larger, and a third one of the ordinary size and make. Wires for keeping them clean and open, a small hone or stone of the finest quality for sharpening the points, a twenty-four minim glass measure perfectly exact, a self-registering pocket thermometer, very superior, contained in a neat vulcanized rubber case ; and last, but not least, a thumb-lancet, also of the best manufacture.

HYPODERMIC.

FIG. 1706.—George Tiemann & Co.'s Hypodermic Syringe Bottle.

(Patented October 9th, 1877.)



Great inconvenience is often experienced in filling a hypodermic syringe from the ordinary bottle, because of its narrow neck and its liability to upset.

The narrow neck prevents the insertion of the end of the syringe, or, if the syringe is screwed upon the bottle, a partial vacuum is liable to be formed, so that the piston returns when released and often some of the fluid re-enters the bottle. The liability to spill the contents of the bottle is increased by the fact that it has to be removed from the case and stood upright.

All these difficulties are overcome by the above improvement, the bottle having the mouth at a right angle to its body and made sufficiently large to admit the nozzle end of the syringe. It need not be removed from the case for the purpose of charging the syringe. You merely turn the neck upward, remove the stopper, insert the syringe into the fluid, and draw upon the piston until the desired quantity of medicine has entered the barrel. The case is made to hold the bottle tightly in any position, so that both may be left on the table during the operation, without fearing for the safety of the glass or its contents.

After having operated and replaced the needle and syringe in the case, the bottle is corked and turned back to its former position.

FIG. 1707.—Tiemann & Co.'s Pocket Case Hypodermic Syringe.



FIG. 1708.—Brown's Pocket Case Hypodermic Syringe.



Brown's Syringe is of hard rubber, of same length and two millimetres greater circumference than the common stylographic pen. The barrel is of uniform calibre throughout. The canulated needle is protected by a sheath, so that the instrument can be safely carried in the pocket case or loose in the pocket. At the upper end of the piston a cap fits air-tight to the syringe; the caps at the two ends hermetically seal the instrument, and thus keep the piston at all times moist and in working order; the danger is also avoided of rusting the instruments associated with the syringe in the case. At the lower end is a receptacle capable of containing a dozen or so compressed subcutaneous pellets. The piston is of metal, graduated and with screw adjustment, and works easily in a bearing in the upper cap.

FIG. 1709.—Extra Needles for Hypodermic Syringes.



Gold,	\$1.00	Steel, gilt,	\$0.75
Steel,	.50	Steel, nickel-plated,	.65

When ordering needles please state how the attachment to the syringe is to be effected, *i. e.*, *screw or slide?*

If you desire needles for syringes *not of our manufacture*, it is necessary to send your syringe to fit them.

Repairing Hypodermic Syringes.

If your glass cylinder is broken, and you want a new one, always send us your fittings.

If any other part of the syringe is wanted, send what you have left, and it will be easy to supply the missing portions.

To prevent *confusion* and *loss*, parties sending parcels to us are requested to *enclose their card in the same*, as otherwise they cannot be identified.

PARACENTESIS.

FIG. 1710.—Set of four Trocars, for Ascites, Hydrocele, &c.



FIG. 1712.—Rubber Bag and Stop-cock for Injecting (Hydrocele).



FIG. 1713.—Robert's Pericardial Trocar.

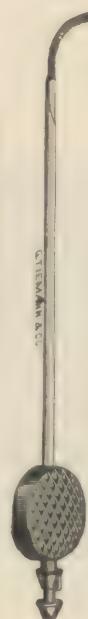


FIG. 1714.—Wood's and Harris' Trocars for Ascites.



FIG. 1711.—Flint's Trocar and Aspirator, for Paracentesis Thoracis.



FIG. 1715.—Exploring Trocar and Case.

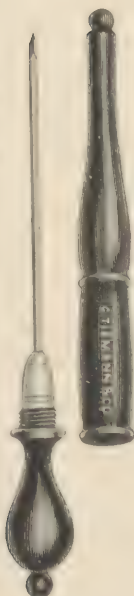


FIG. 1716.—Little's Trocar.



FIG. 1717.—Warren's Trocar.

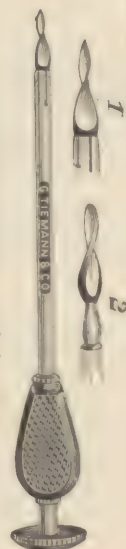


FIG. 1718.—Set of three Trocars.



FIG. 1719.—Trocar and Canula.



PARACENTESIS.

FIG. 1720.—Spencer Welles' Ovarian Trocar.

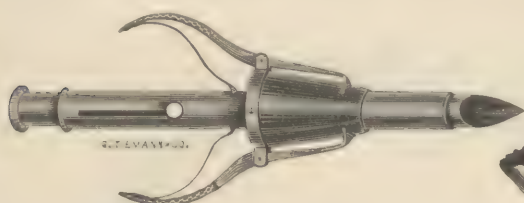


FIG. 1721.—Thomas' Ovarian Trocar.

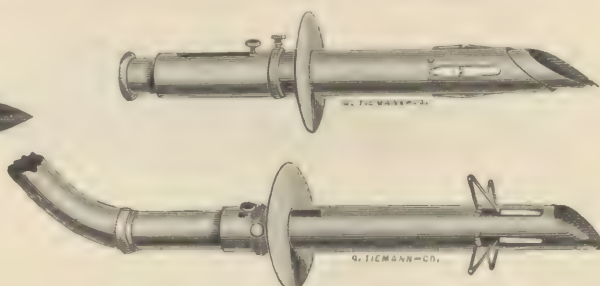


FIG. 1722.—Fitch's Ovarian Dome Trocar (1, 2, 3). Aspirator Needles (4, 5). Clamp Forceps (6).

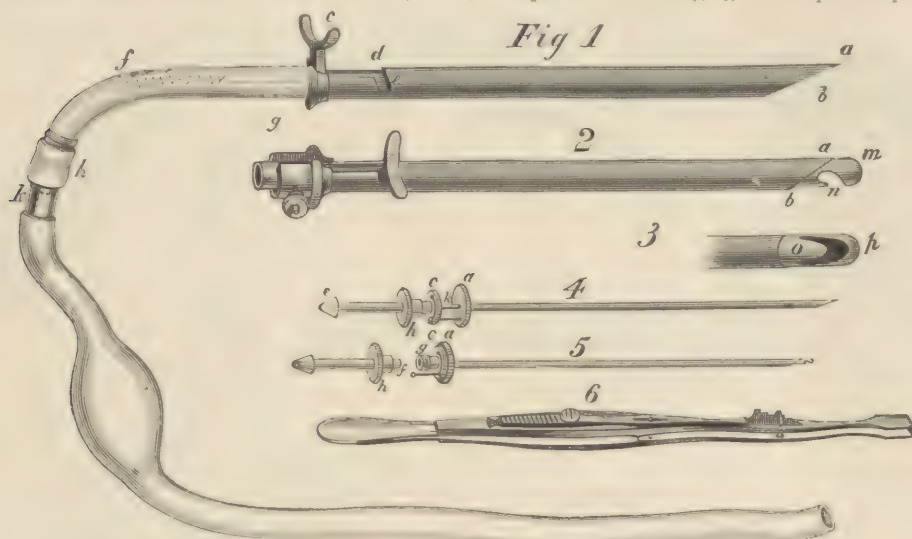


FIG. 1723.—Emmet's Ovarian Trocar.

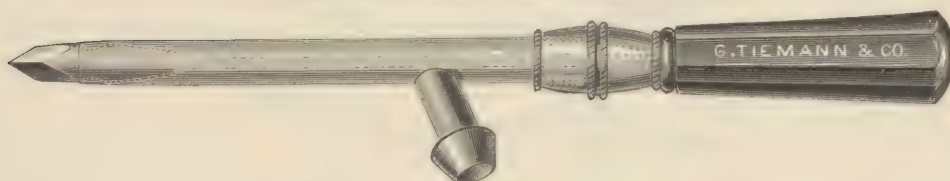
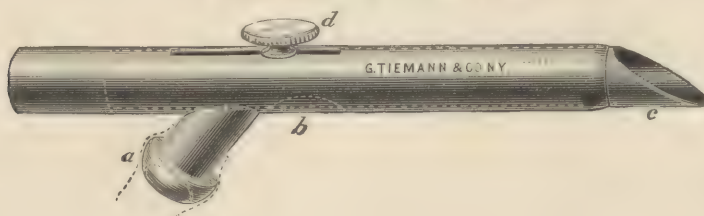


FIG. 1724.—Warren's Ovarian Trocar.



FIG. 1725.—Dunster's Ovarian Trocar.



PARACENTESIS.

FIG. 1726.—Lawson Tait's Ovariotomy Trocar.

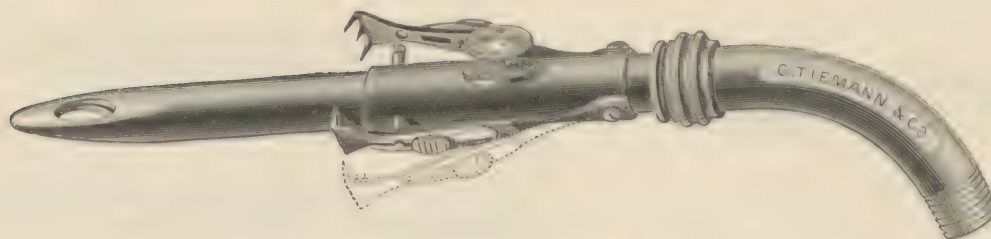


FIG. 1727.—Spencer Welles' Ovariotomy Trocar (latest).

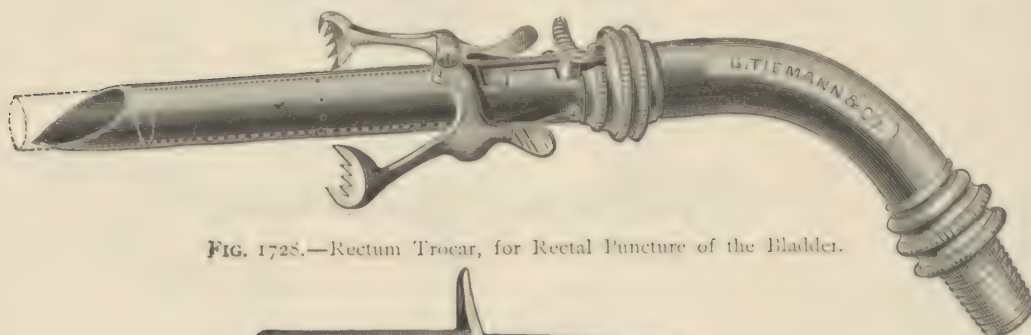


FIG. 1728.—Rectum Trocar, for Rectal Puncture of the Bladder.



FIG. 1729.—Parker's Guarded Rectum Trocar.

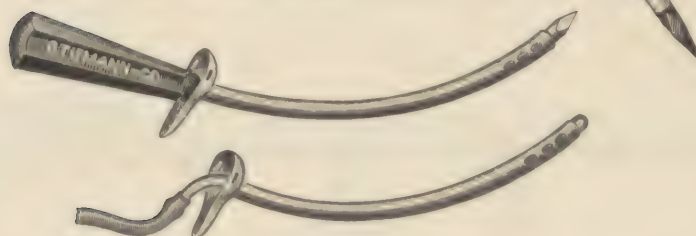


FIG. 1730.—Buck's Rectum Trocar.



FIG. 1731.—Van Buren's Double Silver Tube.



For SUPRA-PUBIC PUNCTURE OF THE BLADDER, see "Dieulafoy's" and other Aspirators.

ASPIRATION.

PNEUMATIC ASPIRATORS.

For evacuation by powerful suction of the fluid contents of tumors, serous and synovial effusions, collections of blood, pus, &c., for relieving retention of urine (supra-pubic puncture of the bladder) and the withdrawing of accumulated gases from the intestines by means of capillary tubes, so as not to leave an open wound nor admit air to the cavity.

FIG. 1732.—Dieulafoy's Aspirator.



This instrument consists of a glass cylinder, *H*, about seven inches in height and two in diameter, with a tight-fitting piston. The cylinder is partly covered with a brass casing, nickel-plated. In front is a graduated scale, showing the amount of contained fluid in grammes.

The piston, *B*, is raised or lowered by turning the handle *A*. Near the bottom of the cylinder are two taps with stop-cocks, *D* and *E*. To these are fitted two rubber tubes, as seen in the cut.

To the extremity of the one, connected with *D*, a capillary trocar may be attached. About four inches from this end of the tube is inserted a piece of glass tubing about three inches in length, so as to allow the fluid to be seen passing to the cylinder.

The contents of the cylinder are discharged through the rubber tube attached to the tap, *E*.

The capillary tubes, or trocars as they are called, represented below the instrument, are six in number, sharp-pointed, and of different sizes, the smallest being about the calibre of the tube of the hypodermic syringe, or one-third of a millimetre in diameter; the largest one and a half millimetre, all of them about four inches in length.

The manner of using the pneumatic aspirator is as follows:

The instrument is first prepared by attaching the rubber tubes to the taps, *D* and *E*. After selecting the capillary trocar, it is to be connected to the tube attached to the tap *D*, as represented in the cut. The extremity of the tube, *G*, should be placed in a basin, to receive the contents of the cylinder.

Closing the stop-cocks, *D* and *E*, the piston is raised by turning the handle, *A*, and is retained in position by the spring, *C*. In this way nearly a perfect vacuum is obtained. The capillary trocar is then introduced with a rotary motion into the part from which the fluid is to be drawn. The stop-cock, *D*,

is then opened, and the fluid rushes into the cylinder, which, when full, is emptied by closing stop-cock *D* and opening *E*, pulling out spring *C*, and lowering the piston. When this is done, both stop-cocks are again closed and another aspiration made in the same manner.

The following practical points should be attended to in using this and other similar instruments:

1. Be sure that your instrument is in perfect order—that the trocars and tubes are pervious, that the stop-cocks and piston work easily and without leakage.
2. Oil the needles or trocars before using.
3. Combine rotation with pressure in introducing the trocar, holding it between the index-finger and the thumb, and introduce slowly, so as to injure the tissues as little as possible.

Local anæsthesia may be used at the point of puncture if desired. A small nick in the integument, made with the scalpel, will facilitate the introduction of the trocar.

4. Remove the trocar slowly, and keep up the aspiration during its removal. This prevents the escape of any of the fluid which may remain in the trocar. This is always to be borne in mind whenever the peritoneum is perforated.

5. After using, carefully wash out the instrument and tubes, and insert fine wire into the sharp-pointed trocar or canula before putting it away.

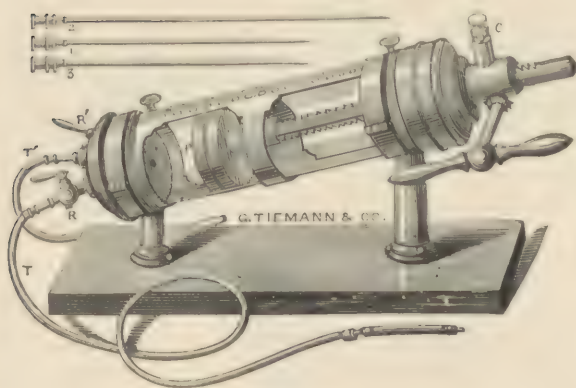
6. It is well occasionally to unscrew the top of the cylinder carefully and pour in about half an ounce of sweet-oil. This will keep the piston in good order.—DR. LITTLE, in *New York Medical Record*, November, 1872.

ASPIRATION.

PNEUMATIC ASPIRATORS.

For removing fluids from the pleural cavity in cases of hydrothorax or empyema; from the cranial cavity in cases of hydrocephalus; from the knee-joint in cases of synovitis; for removing pus from abscesses; for removing gas and the fluid contents of the intestines in cases of strangulated hernia, and thus allowing the gut to be reduced by taxis; also in diagnosing hydatids and abscesses of the liver and tumors of the abdomen; and for puncturing the bladder above the pubes to relieve retention of urine caused by stricture, enlarged prostate or injuries of the urethra, &c.

FIG. 1733.—Hospital Aspirator.



The Hospital Aspirator is the largest Dieulafoy's aspirator in general use. Its arrangement is such as to leave both hands of the operator free to perform any manipulation which may be found necessary.

The rack and pinion movement admits of the piston being tightly packed, and hence a nearly perfect vacuum is obtained for exhausting. There are three stop-cocks at the lower cap, so that all the trocars and voiding tubes may be attached, this enables to wash out a cyst without the necessity for removing the needle. The syringes and needles are exquisitely fitted and finished.

The manner of using and keeping the instrument in order is the same as described on page 129 for the upright aspirator.

Steurer's Aspirator (Fig. 1734).

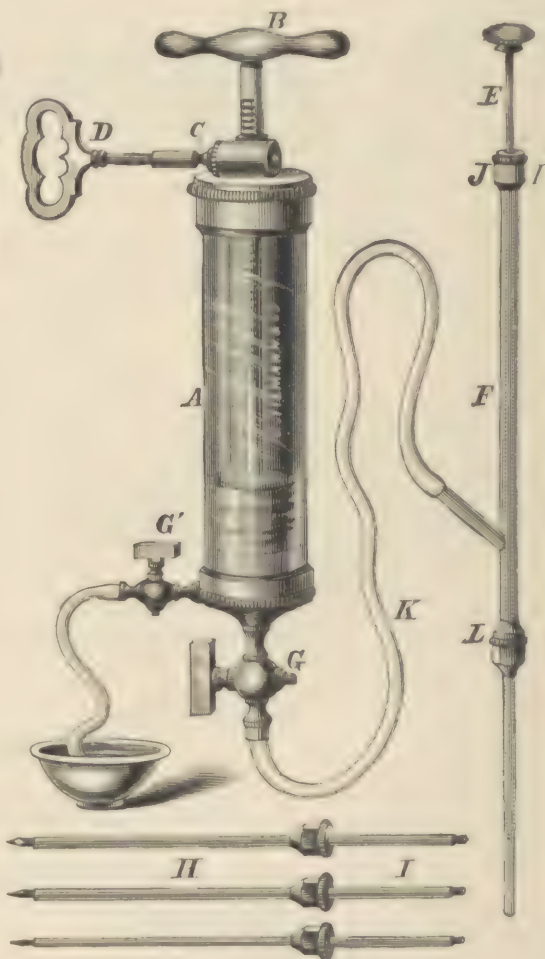
This aspirator proper is identical in construction with Dieulafoy's, and is worked in the same manner; but it is of smaller size, and, having no stand, it must be held with the hand.

Instead of the capillary tubes with sharp points, as Dieulafoy's, we have trocars provided with three-cornered stilets, as in the ordinary trocar. The shaft of the stilet is piston-like, working through an air-tight chamber at *I*.

After the trocar has been introduced, the stilet is drawn back until it stops at *I*—the point being then at *F*. This opens the canula, *L*, and tube, *K*, for the influx of matter. Now, if the barrel, *A*, is filled, the stop-cock, *G*, on the lower end shut, and the other one on the side of the barrel opened, the contents may be voided by pushing the piston, *B*, either directly or by means of the key, *D*, down into the barrel. New aspirations, *ad libitum*, may now be made without being necessitated to remove the trocar from the wound.

The trocar is a modification of Bilroth's instrument for performing aspiration without permitting the entrance of air into the punctured cavity. The instrument can be used for injecting as well; but, for obvious reasons, when so used, it ought to be well cleansed by passing warm water through it.

FIG. 1734.—Steurer's Aspirator.



ASPIRATION.

PNEUMATIC ASPIRATORS.

For removing fluids from the pleural cavity in cases of hydrothorax or empyema; from the cranial cavity in cases of hydrocephalus; from the knee-joint in cases of synovitis; for removing pus from abscesses; for removing gas and the fluid contents of the intestines in cases of strangulated hernia, and thus allowing the gut to be reduced by taxis; also in diagnosing hydatids and abscesses of the liver and tumors of the abdomen; and for puncturing the bladder above the pubes to relieve retention of urine caused by stricture, enlarged prostate or injuries of the urethra, &c.

FIG. 1735.—Tiemann & Co's Aspirator.



This instrument consists of a clear glass bottle, 1, with a graduated scale showing the amount of fluid contained. It is closed by a rubber stopper, through the centre of which a double current tube, 2, passes. This is attached to, 3, an elastic hose with, 4, an exhausting pump and, 5, another elastic hose with, 6, a stop-cock, on the top of this a capillary tube or trocar, 7, is attached. Three sizes of trocars or tubes go with the instrument. It is *reliable in action* and of *simple construction*.

The Manner of Using the Instrument.

1st. Select the capillary tube or trocar, see that it is pervious, and attach it to the stop-cock, 6.

2d. Close the bottle tightly with the stopper, 2; screw the air pump well home to its fitting, 3, and shut the stop-cock, 6.

3d. A vacuum is now formed in the glass bottle by giving from thirty to fifty strokes of the air pump, and the instrument is ready for use.

4th. Local anaesthesia may be used at the point of puncture and a small nick made in the integument with a scalpel, to facilitate the introduction of the trocar.

5th. The trocar should be oiled and *introduced slowly*, combining rotation with pressure, so as to injure the tissues as little as possible.

6th. The stop-cock, 6, is then opened.

The fluid, if thin and clear, will now rush into the glass bottle quite fast; if it is thickish, it will drop down slower.

The flow can be stopped at any time by closing the stop-cock. If more than one quart or bottle full is to be drawn, the stop cock, 6, must first be closed, the stopper, 2, removed from the bottle, which is then emptied, and the operation repeated as above described.

Should the fluid cease to run, a few strokes of the air pump will make it flow again, unless the trocar be obstructed by fibrinous matter. In this event it must be withdrawn, cleaned out with the wire stilet, and re-introduced; or better, one of a larger size instead.

When the operation is completed: Remove the trocar slowly, *keeping up the aspiration during its removal*, to prevent the escape of any fluid which may remain therein. This is especially to be borne in mind whenever the peritoneum is perforated.

How to Keep the Instrument in Order.

1st. If the instrument is not used often, the *valves* may become sticky and adhere to the brass; run a fine needle under and separate them carefully; or,

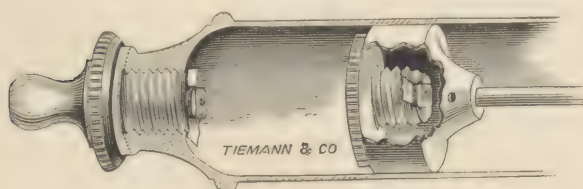
2d. *Renew the valves* in the following manner: pass a strip of our valve material or of oil-silk, one-eighth of an

inch wide, over the perforation in the valve-cone, and tie it to its neck with a waxed silken thread.

3d. Oil the leather piston before use.

4th. *After use*, wash out with warm water, dry and oil the trocars and put them away with the wires inserted.

If these rules are observed, the instrument will always be in order.



ASPIRATION.

PNEUMATIC ASPIRATORS.

FIG. 1736.—Higgins' Aspirator and Injector.

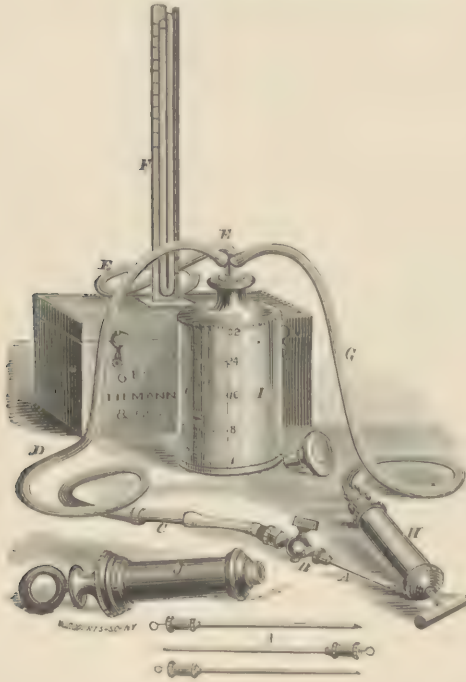
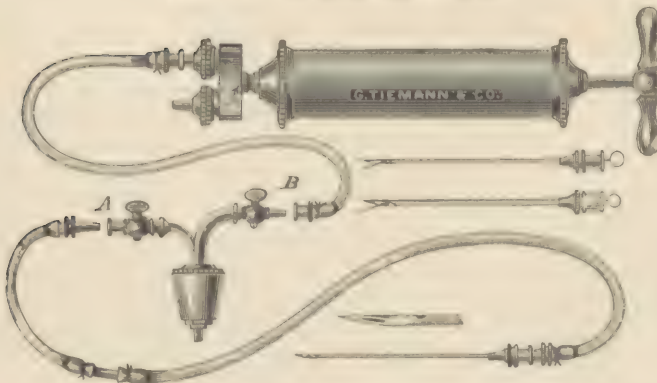


FIG. 1737.—Aspirator and Injector.



sufficient vacuum to fill a bottle holding from one pint to a quart. After having formed the vacuum, close the stop-cock, *B*, and the instrument is ready for use.

To Inject with same Instrument.

Connect the air-tube with the outward flow chamber of the pump as directed by the arrows; put the desired liquid in the bottle, then fasten or tie the stopper securely to the bottle, and while holding the receiver in a reverse position inject air into it. After having obtained the desired pressure, close the air-cock, *B*, and open the fluid-cock, *A*, and with it control the flow of liquid. Care should be taken to close the fluid-cock in time to prevent the escape of air. The pump should never be worked while the fluid-cock is open, as an air bubble might pass with the out-flowing fluid.

This instrument is similar to Tiemann & Co.'s, with the following additions: through the rubber stopper for the glass bottle is passed a triple current tube. Behind the bottle is seen the case in which the instrument is kept when not in use. The top of the case has a slot into which a vacuum-gauge is fitted.

The needle or trocar, *A*, connects with the stop-cock, *B*; this to a short piece of rubber tubing, this is followed by a short glass tube, *C*, to allow the fluid to be seen passing to the bottle; the rubber tube, *D*, connects with one of the outlets of the triple current tube passed through the stopper. The second arm of the outlet, *E*, connects the bottle with the vacuum gauge by means of rubber tubing, *E*. To the third outlet of the triple tube through the stopper is connected, also by means of stout rubber tubing, *G*, the brass air pump, *H*. When this pump is worked the vacuum gauge, *F*, indicates how near to perfection a vacuum is obtained.

The manner of using the instrument is the same as given for Fig. 1735, page 131.

The syringe, *J*, is attachable directly to the points, needles or trocars, that are to be used for *injecting* cavities. This is intended to avoid the danger of poisoning a patient, which may occur when injections are made by means of an instrument that has previously been used for aspiring septic matter, or that may not have been properly cleaned.

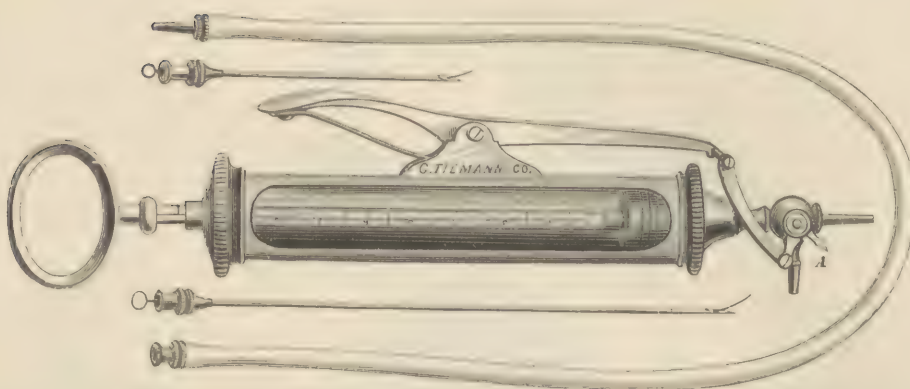
Directions for Using as an Aspirator.

Insert the stopper firmly into a strong bottle (a clear glass one preferred), then attach the short elastic hose to the stop-cock, *B*, of the tube projecting from stopper, attach the other end of same elastic hose to the exhausting or inward flowing chamber of the pump.

Next attach one end of the longer elastic hose to the stop-cock, *A*, projecting from stopper, and the other end to the needle. Care should be taken that all the fittings or attachments are placed *firmly* into their respective places. Now close the stop-cock, *A*, and open stop-cock, *B*, and by giving from thirty-five to fifty strokes of the pump you can produce

ASPIRATION.

FIG. 1738.—Emmet's Aspirator.



It has a glass graduated cylinder; the piston consists of double cups of leather, making it perfectly air tight to the up or down stroke. The stop-cock works by a lever, as in a stomach pump. It can be used for either injection or aspiration.

FIG. 1739.—Warren's Aspirator Needle.



FIG. 1740.—Miller's Aspirator.

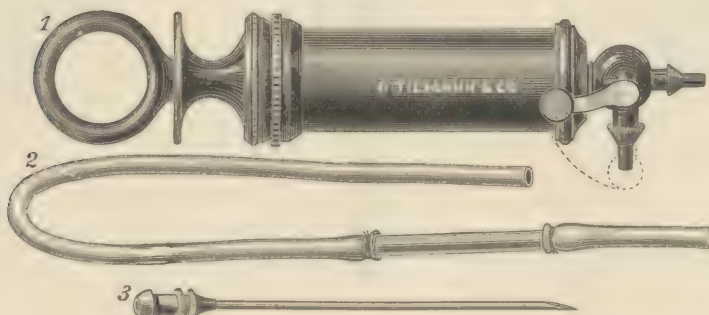
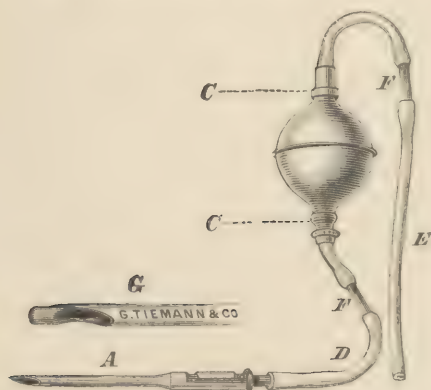


FIG. 1741.—Fitch's Handy Aspirator.



1. Pump with stop-cock; 2. Flexible exhaust tube with short glass tube inserted; 3. Needle.

To use the instrument, attach one end of the tube, 2, to the needle and the other to the pump, and then, after introducing the needle, turn the lever and draw the piston. When the pump is filled turn the lever and shove down the piston. This action may be repeated as often as necessary. By reversing the action, the instrument can be used to inject a cavity as well.

Fitch's Handy Aspirator (Fig. 1741).

A represents the dome aspirator needle, with the cutting point projected, ready for puncture; G, a magnified diagram of the same, after insertion, with the dome advanced so as to protect the interior of the cavity during aspiration; E, bulb in upright position, to insure the best action of valves; C C, valves; D, entrance tube; E exit tube; F F, bits of glass tubing, through which to observe the presence or absence of fluid.

OPHTHALMIC.

OPHTHALMOSCOPES.

FIG. 1742.—Liebreich's Ophthalmoscopes.

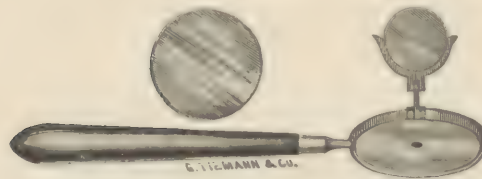
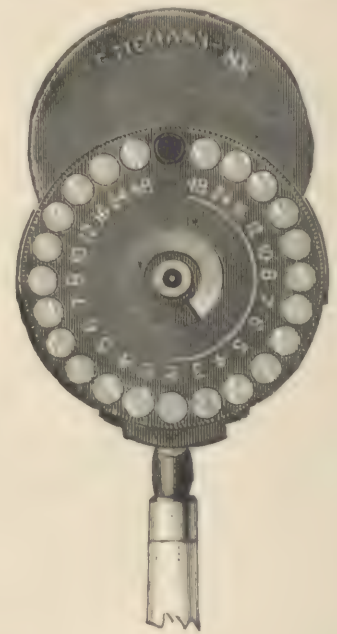


FIG. 1744.—Dudley's Ophthalmoscope.

FIG. 1743.—Knapp's
Single Disk Ophthalmoscope.FIG. 1745.
Loring's Student Ophthalmoscope.

ON THE USE OF THE OPHTHALMOSCOPE.

Some of the simplest applications of optics to the observation of the eye, and detection of diseased conditions, depend upon the fact that the transparent structures still reflect some light, and more when diseased than when healthy. Thus:

Firstly.—We examine the reflecting efficiency of the surface of the cornea, in order to determine its transparency. In cases in which there is no large opacity, but simply a general steaminess caused by an uneven surface, it may be difficult to detect it by direct inspection, but if we expose the eye to the light, and look at the image of the window-frame produced, we shall see distinctly that this image is blurred and indistinct, like that from a greasy mirror.

Secondly.—We use what is called the catoptric test to determine the presence or absence of the lens. This depends upon the fact that the surfaces of the lens reflect images. Dilate the pupil well with atropia. Hold a small taper in front of the pupil in a dark room. You will observe, if the lens be present, three images: an anterior one, bright, distinct and erect—from the front surface of the cornea; a middle one, inverted, small, fairly distinct—from the concave posterior surface of the lens capsule; a posterior one, erect, indistinct—from the anterior surface of the lens capsule.

Thirdly.—Again, the surfaces of the crystalline lens easily become visible, by the light which they reflect, whenever we can see them obliquely. When the lens is in its normal position it is difficult, unless by oblique illumination, to see

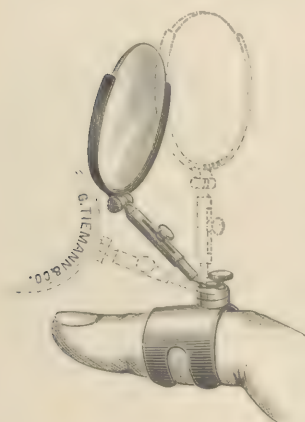
OPHTHALMIC.

OPHTHALMOSCOPES. (Continued.)

its surface; but if it is misplaced, as we sometimes find it, by congenital imperfection, or from injuries, then its surfaces, being oblique, become easily visible. Any one not aware of this fact would at once declare that the misplaced lens was also slightly opaque, and erroneous observations to that effect are to be found in some records of such cases.

In former days the catoptric test used to be much employed to determine the transparency, or otherwise, of the crystalline lens. Now, however, it has been wholly superseded by another discovery, which in its every-day usefulness is second only to that of the ophthalmoscope itself. I allude to oblique illumination. To accomplish this is the easiest

FIG. 1746.
Noyes' Lens Holder.



matter possible, and by its aid any one of the slightest skill can, in almost all cases, determine at a glance the condition of the patient's pupil and of his crystalline lens. The smallest dots of pigment on the capsule, the least possible streaks of an incipient cataract, become by its aid conspicuously definite. We have no longer any need for the curious, but very disappointing, catoptric test which fails us just when most needed, *i. e.*, in slight cases; for the discovery of cataract, in any stage whatever, is now perfectly easy. For oblique illumination you need only a candle and a convex lens, say a two-inch. The pupil should be dilated with atropia, and the candle having been placed to one side of the patient's head, the lens is held so as to receive its light, and concentrate it to a pencil, which is thrown upon the patient's eye. All the superficial parts, *i. e.*, the cornea, the iris, the pupil, and the lens, may thus be brilliantly lighted up. In addition to the illumination, we may also, with another lens, employ magnifying power, and thus inspect the state of things yet more accurately.

Oblique illumination is applicable to all morbid conditions of the cornea, iris, or lens, and to blood-clots in the anterior part of the vitreous or new growths which bulge forwards into the anterior half of the globe. You cannot, however, by its aid, see the fundus of the eye. To do this we must employ another instrument. Here let us ask the important question, Why is an ophthalmoscope necessary? Why can we not, by simply looking into the little round box, one inch

deep, which constitutes an eyeball, see what is at its bottom? The answer is, that the eyeball is not simply a box, it is an optical instrument, and it is from its lens apparatus that the difficulty comes. The rays of light received by the eye are brought to a focus on the retina; back again from the retina they are reflected, and pass out of the eye, destined to depict somewhere an image of the retina itself. The lens apparatus, however, not only brings the rays passing in to a certain and definite focus on the retina, but it acts on those which pass back, and brings these also to a focus at a certain and definite place. There is no difficulty whatever in illuminating the fundus, any light held in front of the eye will do that, nor have the structures of the fundus any difficulty in reflecting light by which they themselves ought in turn to become visible. The difficulty is in bringing the eye of the observer into the line of the reflected rays; this without artificial aid is impossible, and hence the necessity for the ophthalmoscope.

I have said that every lens has a principal focus, or spot at which parallel rays which impinge upon it are made to meet by the convergence induced. Now, suppose that from this focus the rays are reflected back again, they must pass through the lens in the reverse direction, and will again become parallel. If, however, divergent rays be used, they will in returning be converged and made to meet at another focus in front of it. Inasmuch as the rays were at first not parallel but divergent, the focus at which, after passing through the lens, they meet, will not be at the same distance as that for parallel rays, but at a greater one. The distance will always be in exact proportion to the degree of divergence, and thus the two foci will always bear mutual relations to each other. If one be brought nearer to the lens the other will be further off, and *vice versa*. Let us call them from this fact, that they maintain mutual relation, "*conjugate foci*." You may observe, if you like, that although conjugate, they keep each other at a distance. It is absolutely necessary that you should observe that all the rays of light passing out from the eye take a direction towards this conjugate focus, and that thus an observer who would make use of them to see the fundus must bring his eye into their line. This line, however, is the same that the rays took in passing into the eye, and if you try to intercept those coming out, you will intercept those going in and cut off the source of illumination.

Thus if we hold a candle two feet in front of the observed eye, its rays, divergent, will be refracted in entering the eye, and will depict an image on the retina—they will then be reflected and again refracted in such a manner that an image of the fundus will be found at the position of the candle flame, that being the position of the conjugate focus. If the observer puts his head in the direction of these rays between the candle and the observed eye, of course he stops the rays which should have entered from the candle, he illuminates only the outside of his own head, and the eye of his patient is left in shadow. If he tries to see by looking from beyond the candle, then the flame of the latter intercepts his view and dazzles his eye. What is wanted is some contrivance to enable the observer to bring his head into his own light. Now the mirror of the ophthalmoscope does this, a reflecting surface with a small hole in the middle, it

OPHTHALMIC.

OPHTHALMOSCOPES. (Continued.)

practically makes the observer's eye the source of illumination, and brings it into the direction which the rays of light returning to their conjugate focus must take. Foreshadowed by Cumming, invented by Helmholtz, improved by Coccus, Reute, Liebreich, and many others, this little instrument, which has worked such a revolution in ophthalmic science, is thus simple in its essential principle.

The ophthalmoscope, as in daily use, consists of two parts, a mirror and an object lens, and to these is often added an eye-piece as well. The mirror, however, is the essential, the other parts are accessories intended for different special purposes. Without troubling you with details respecting the various modifications of the instrument, I will now describe the use of the simplest of them, a reflecting mirror slightly concave, and with a perforation in its centre.

Having placed the patient's head in such a manner that the light (a lamp, candle, or gas-light) is on a level with his temple, and slightly behind it, and his face, as a consequence, in shadow, the observer sits in front and applies the back of the ophthalmoscope mirror to his own eye. He should keep both eyes open that he may see where the light falls, and then move the mirror until the light falls full on the pupil of his patient. In a moment he will perceive the first fact which this instrument reveals, that the fundus is not black, as it has always appeared to be before, but that it is of a brilliant fire-red. He will, however, see nothing of the fundus distinctly, only a general red reflex. Now at this point the student must stop awhile and use his mirror, to inspect, first, the transparency of the cornea, and next, that of the lens and vitreous, and to do this he must make the patient move his eye in various directions. After a little practice he will be able to manage his light well, and to throw it with precision wherever he may wish, and to keep it steadily on any given part. At a first lesson he may even, with advantage, practice for awhile by illuminating the second button of the patient's waistcoat. Tact in directing the light having been obtained, we may now proceed further. Instruct the patient to look, not full in your face, but over one shoulder; if you are inspecting his *right* eye, over your *left* shoulder. You will, when he does this, notice at once that the tint of the light reflected from his fundus is changed, that it is no longer fire-red, but canary-yellow. The reason of this is that a different part of the fundus is exposed to view—that, namely, of the optic disc itself, which is much lighter in color than the rest. The area of yellow is very large—occupies, indeed, the whole of the field, while we know that the disc itself is very small. This proves that the objects thus indistinctly seen are immensely magnified. Magnified by what? By the patient's own eye, which, as we have said, is equivalent to a lens of one-inch focus.

Hitherto, we have seen nothing distinctly, but if the observer now brings his head very close to his patient's face, he will be able with more or less facility to observe the details at the bottom of the eye, the trunks of vessels of the retina, the optic disc, &c., &c. All these will be seen very large indeed, being still magnified by the patient's eye. What he sees now is equivalent to type looked at through a one-inch lens, placed exactly one inch in front of it.

[It is plain, then, that we cannot see the fundus of the eye without optical aid. Of such aid, we have our choice of the inverted and of the erect. Both are seen much magnified, the latter much more so than the former. For ordinary purposes the inverted image is used. It is seen very easily, and it brings a large field into view at once, so rendering the observer much less liable to inconvenience from slight motions of the patient's head. The examination of the erect image is chiefly useful for the inspection of detail, and even for these it requires great practice.]

Next I will attempt a few suggestions by which beginners, and those who use the instrument but seldom, may best hope to avoid mistakes.

1. Always indulge yourself in the use of atropine, and by its aid both enlarge the patient's pupil and paralyze his accommodation. Experts can manage without, and may sometimes smile at those who are obliged to use it, but the increased facility which it gives is such that no beginner should neglect it. The objection that it causes the patient inconvenience is a very trivial one. What the patient wants before all things is, that a correct opinion should be formed, and to this end he is quite prepared to make a little sacrifice of convenience. For want of the use of atropine I think I have known even experts overlook things which would have been apparent at a glance had it been used.

2. Always proceed on system. Examine the eye first without the object-lens and ascertain the state of the cornea, lens, and vitreous. No mistake is easier to make, or more frequently made, than by the immediate employment of the inverted image to overlook the fact that the media are not perfectly transparent. With strong illumination you can look right through a slight opacity in the cornea, lens, or vitreous, and observe only that the retina and choroid are seen indistinctly. Many a diagnosis of "hazy retina" ought to have been "opaque vitreous." It is like criticising the beauty of a prospect, and declaring that it looks dull, when you have forgotten to observe that the window wanted cleaning. If you have any doubt as to the state of the cornea or lens, examine them by oblique illumination before going further. Many opacities in the cornea are so slight that you overlook them on naked-eye inspection, and also with the ophthalmoscope mirror, but find them directly by oblique illumination. Need I add that you must be very particular that your object-lens, when you use it, is quite clean. Any stains on it will be seen as if on the patient's retina.

3. Having completed your examination of the media, still proceed on system. The next duty is to estimate the length of the eyeball. A patient may come complaining that he is rapidly losing his sight, and you may find that it

OPHTHALMIC.

OPHTHALMOSCOPES. (Continued.)

really has become so defective that he cannot read the largest ordinary print. You hastily assume that he must have some disease of the deep parts, some form of amaurosis. You proceed to ophthalmoscopic examination, and again hastily employ both mirror and object-lens, and it is quite possible that you may overlook altogether the fact that the eyeball is much too short and the patient hypermetropic. In high degrees of hypermetropia, if sudden failure of accommodation happen to occur, the defect in sight may often be so great as to draw the attention quite away from the right scent. I have already described the method by which we ascertain whether an eye is abnormal as to length. For

the benefit of the mere novice, I may, however, here add, that whenever, without the object-lens, any of the details of the fundus—vessels, disc, patches, &c.—are easily seen, he may be quite sure that the globe is either too long or too short, or that the lens is wanting. If these objects are seen very easily, and the image very bright and beautiful, then, in all probability, it is an inverted image, and the eye is myopic. If only large trunks of vessels have been seen, and these not easily kept in view, then probably it is the erect image, and the eye hypermetropic.

4. Still proceed on system. Having ascertained that the media are clear, and that the eyeball does not materially deviate from its normal length in either direction, you may now examine in succession the optic disc and its vessels, the retina, and choroid near to it, the yellow spot, and lastly, the outlying districts. I must mention each of these separately.

5. The Optic Disc. Note its shape, its margins, whether definite or otherwise, its color, and its level. Observe whether the vessels upon it are seen sharply or not, and look particularly as to how they conduct themselves at its margin. Distinguish between artery and vein, and note the size of each. It is a common mistake with young observers to pay attention to the vein only. In the healthy state the disc should be round, and its choroidal ring distinct and sharp; the vessels on its surface should be seen with beautiful clearness, and the difference between vein and artery, as to size and color, should be readily distinguished. In the centre, or near it, and close to where the trunks of the vessels dip back, there will be seen a bright white patch. This white patch may be large and very conspicuous in some eyes, and small in others, whilst still the eye is not in the least diseased. As regards the vessels, you must distinguish between the large branches of those destined to supply the retina, and the minute ones which give a general pink tint to the nerve itself. The latter may be much diminished, whilst the former retain their size.

Amongst the more common peculiarities displayed by the disc in a state of disease, we have—

1st. The formation of crescents by its side, or of irregular circles around it in myopia.

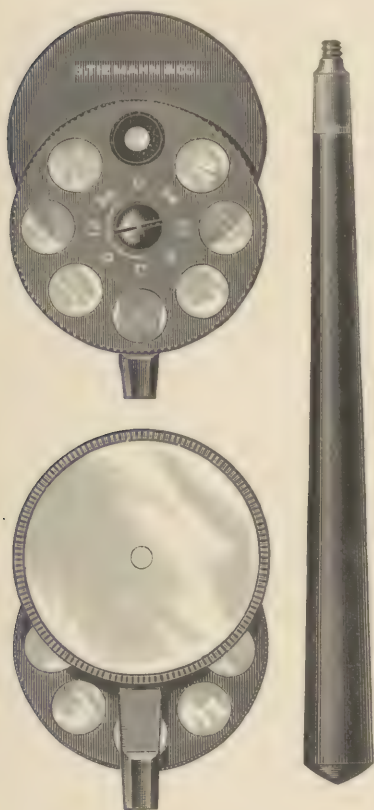
2d. A jagged condition of the choroidal rim, indicating either the commencement of crescents, or the previous occurrence of inflammation (neuritis).

3d. A hazy semi-opaque appearance of the structures in which the retinal vessels run, by which the latter are in part concealed and rendered indistinct. In this state the margins of the choroidal rim are concealed, and the disc appears to be much increased in size, and to be limited by a shaded, indistinct edge. This "woolly" condition implies neuritis.

4th. The disc may be too red or too pale. The pallor sometimes amounts to absolute whiteness, sometimes it is blue-white, and sometimes it is a dirty gray tint. Sometimes the pallor affects the whole disc surface, and at others only a part. If only a part, the third next to the yellow spot is that usually affected, and in commencing cases this is always the first to suffer. The pallor may indicate mere anæmia, with, perhaps, primary atrophy, or it may indicate an anæmia and atrophy which are secondary to inflammation. It requires much experience to decide this point.

5th. The disc, instead of being on the same level as the rest of the retina, may be pushed backwards, or cupped as it is called. This cupping will be recognized by carefully tracing the main trunks of vessels and observing whether they curve on passing over the choroidal margin. If the cup is well marked, the vessels will bend so much that they are lost sight of at the edge of the disc, to be found again on its surface, looking much smaller and paler than those in the retina, and requiring a little movement of the object-lens to bring them well out. Cups of this kind imply intra-

FIG. 1747.
Loring's 7 Lens Ophthalmoscope.



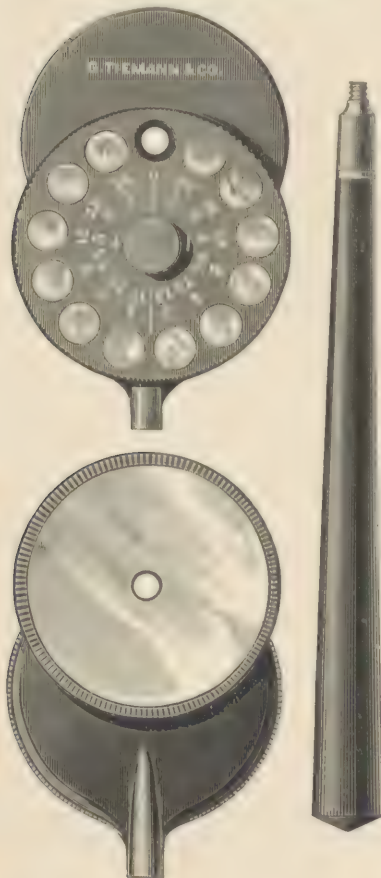
OPHTHALMIC.

OPHTHALMOSCOPES. (Continued.)

ocular pressure, the characteristic of the disease known as glaucoma. With them pulsation of the vessels may often be observed.

Having carefully studied the disc, your attention will next be directed to the retina and its vessels. The retina ought to be almost perfectly transparent, but in dark eyes—and particularly in members of the dark races—a delicate haze, or bloom-of-plum appearance, may be observed in it, especially near to the yellow spot. You ought to be able to trace the retinal vessels with the greatest ease. If this cannot be done, then inflammation of some kind or degree is present.

FIG. 1748.
Loring's 12 Lens Ophthalmoscope.



The grand characteristic of inflammation, as far as the retina is concerned, is opacity. This opacity may vary from the merest haze to that of the dense white or gray pellicle. By this haze the trunks of the vessels will probably be more or less concealed, but if the deeper layers of the retina are affected, their concealment may not be much. You will remember that the retina consists of three principal layers—that of rods and bulbs, which is close to the choroid, and probably fed by it, that of nerve cells, granular matter, &c., in the middle, and that of nerve-tubes (derived from the optic), &c., which is innermost. It is in the latter layer only that the arteria and vena centralis run: these vessels have nothing to do with the deeper or outer layers. The inflammation may affect chiefly the inner or outer layer, being in the one case a neuro-retinitis, in the other a choroido-retinitis.

In some cases of retinitis, as in that which attends Bright's disease, hæmorrhages are very common.

The yellow spot is recognized almost as much by its negative features as by any distinctive peculiarities. It is situate a little to apparent nasal side (inverted image) of the optic disc, and is exactly opposite the observer when the patient looks at the ophthalmoscope mirror. No large vessels cross it. It is more highly pigmented than the neighboring parts, and also often looks rather hazy and indistinct. It is here that the deposits characteristic of Bright's disease are earliest seen.

The choroid is the tissue which gives color and glow to the fundus. It may vary exceedingly within the limits of health, and its variations will cause apparent haze, or otherwise, in the retina. Before trusting yourself to any ophthalmoscopic descriptions whatever, examine carefully the differences in the eyes of fair and of dark persons. In the latter you will find the choroidal epithelium full of pigment, and showing dark mapped-out areas, which might easily be supposed to be morbid, whilst the vessels of the choroid are concealed. In the fair-complexioned eye the leashes of vessels will be seen with marvelous brilliancy and beauty, and the suspicion of atrophy will be suggested.

It is much more common to see the results of inflammation in the choroid than to trace the early stages of such. The results are permanent, and very conspicuous. The epithelium may be absorbed in large patches, usually with masses of black pigment remaining. The absorption may implicate deeper layers, and be attended by atrophy of the vas-

cular rete and exposure of the sclerotic. The patchy condition in a case of choroiditis disseminata may be compared to that of a piece of well-marked tortoise-shell.

Inflammation of the choroid in patches is usually of syphilitic origin. Atrophy of the choroid, independent of inflammation, is frequent in advanced states of myopia.

Inspection of the outlying districts of the fundus is easily done, by making the patient look upwards, downwards, &c., strongly. It should never be omitted; for not unfrequently changes may here be discovered which will be the key to the case. It is here that the dots of pigment, characteristic of retinitis pigmentosa, will be first found. Here also, in syphilitic inflammation of limited degree, patches may be sometimes found when there are none in the central parts of the fundus.

Having mentioned some of the chief morbid conditions to be expected, I will now specify some of the errors into which novices with the instrument are likely to fall. Like all other instrumental aids—and the stethoscope is a prominent example—the ophthalmoscope must be expected to lead to many mistakes. It is difficult to use, and requires long experience before the observer can trust his own interpretation of what he has seen. Want of familiarity with the

OPHTHALMIC.

OPHTHALMOSCOPES. (Continued.)

varying conditions which may be met in health, is a main cause of error. Thus a well-pigmented choroid in a dark-complexioned person may be easily apprehended. A very large physiological cup may be taken for "white atrophy," or for a glaucoma cup; a margin of black pigment at the edge of the disc may be attributed to disease; and alterations in size of vessels, which are peculiar to the individual, may be supposed to imply anæmia or congestion. It is possible, also, in a highly pigmented eye, to mistake the yellow spot itself for the remains of a blood clot. As to the common error of fancying the retina hazy when the appearances are due to opacity in one or other of the media, I have, I think, already said enough.

Degrees of vascularity are especially difficult of satisfactory comparison. You will hear one authority assert that the disc or retina is congested, when another will declare that they are quite normal. Let me warn you against the diagnosis of "congested retina." In four out of five of the cases in which the words "hyperæmic retina" are used, they are probably employed in error. Both in the optic disc and in the retina, the size of the vessels may differ widely and be still within the bounds of health. Just as one person may have a florid cheek and red ears, and another pale ones, yet both be in good health, so may the color of the optic disc and the size of the retinal vessels differ. The conditions of the circulation in the retina are such as to make any condition analogous to erythema of the skin simply impossible.

If you find the retina visibly reddened, be sure that it is not simply "congested," but stained by effusion, in fact, inflamed. The individual arteries are too far apart to give any general red color to the whole. The interpretation of congestion must rest on the enlargement of their trunks only; and this, which is a comparative question, is very difficult to estimate. The old notions as to active congestions preceding inflammation, must be abandoned for the retina, as elsewhere. We now know that cell changes are the essential factors in inflammation, and that it is these that induce vascular changes. I do not by any means deny that the optic disc and retina may in some cases contain too much blood, and yet show no trace of inflammation; but I feel sure that these conditions are far less frequent than they are thought, and I warn the beginner against the fatal facility of explaining amblyopia by discovering congestion.

[JONATHAN HUTCHINSON, Esq., Surgeon to the London Hospital, in "Clinical Reports of London Hospital," 1867-8, p. 182.]

Knapp's Single Disk Ophthalmoscope (FIG. 1743).

It has a series of auxiliary lenses as extensive as any ophthalmoscope, with the exception of Dr. Knapp's double disk instrument. It is sufficient for all the purposes of the student and practitioner in ophthalmic surgery. When the instrument is held 20 millimetres from the patient's eye, the accompanying table will indicate, in millimetres, the shortening and elongation of the optical axis as determined with this (and other) instruments in the erect image and by relaxed accommodation.

For a full description of the instrument, see "Archives of Ophthalmology and Otology," Vol. IV., No. 1.

TABLE indicating, in millimetres, the shortening and elongation of the optical axis, as determined with this (and other) instruments in the erect image and by relaxed accommodation. The instrument to be held 20 millimetres from the patient's eye.

Number of Glass.	OPTICAL AXIS.			Number of Glass.	OPTICAL AXIS.	
	Shortened.	Elongated.			Shortened.	Elongated.
2	6.12	5.08	||	8	1.42	1.36
3	3.95	3.49	||	10	1.13	1.09
4	2.91	2.65	||	12	0.94	0.91
5	2.31	2.14	||	16	0.70	0.69
6	1.91	1.80	||	24	0.47	0.46
7	1.63	1.55	||	48	0.23	0.23

Knapp's Double Disk Ophthalmoscope (Fig. 1749).

Two disks are placed behind the mirror, the upper containing one empty aperture and thirteen concave glasses, the lower one empty aperture and thirteen convex glasses. Each disk is fastened like the one in the Single Disk Ophthalmoscope, and is moved separately, the superior one on the upper edge of the instrument, the inferior one on either side of its lower end. The edges of the two disks overlap behind the opening in the mirror in such a way that by combination of concave and convex glasses, as great a variety of auxiliary lenses can be obtained as the most minute physiological and pathological examination ever will require.

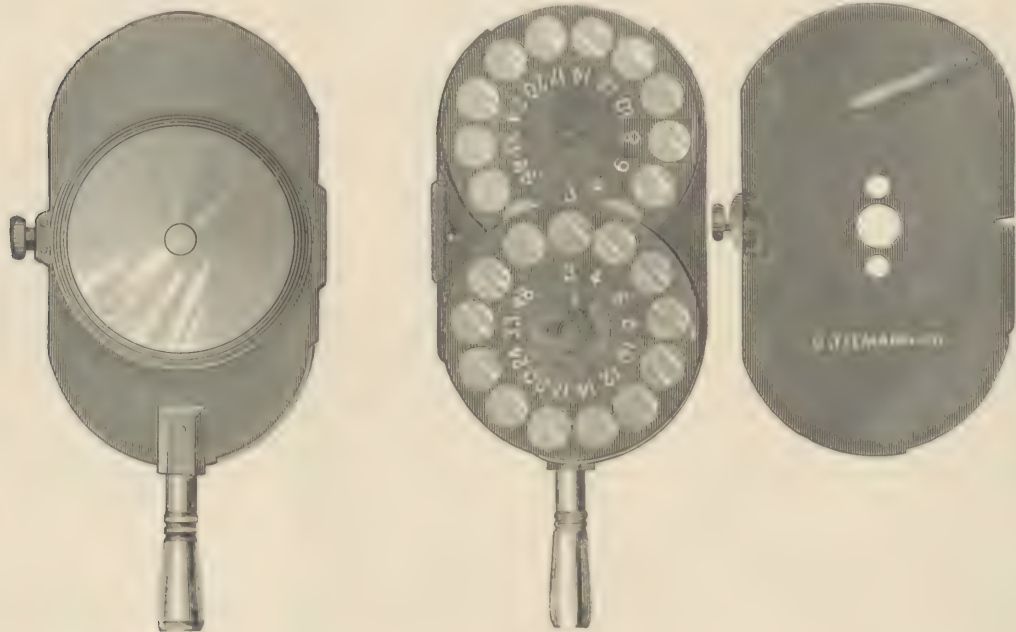
OPHTHALMIC.

OPHTHALMOSCOPES. (Continued.)

FIG. 1749.—Knapp's Double Disk Ophthalmoscope.

a. Front View (Mirror).

b. Lens, Disks and Cover (removed).



This instrument offers a complete series of correcting glasses to the expert ophthalmoscopist if he wants accurately to ascertain the dioptric condition of an eye independently of the statements of the patient, or to determine the relief of the background of the eye, and follow its changes in the course of exudations, tumors, excavations, &c. A full description of this instrument, with many practical remarks, may be found in the "Archives of Ophthalmology and Otology," 1874, Vol. III., No. 2, pp. 1-25. A convenient series of glasses, their combinations and optical effects, is seen in the following table.

TABLE indicating the ophthalmoscopic determination of the shortening, resp. elongation of the ocular axis by means of positive, resp. negative auxiliary lenses. The instrument to be held 20 millimetres from the patient's eye.

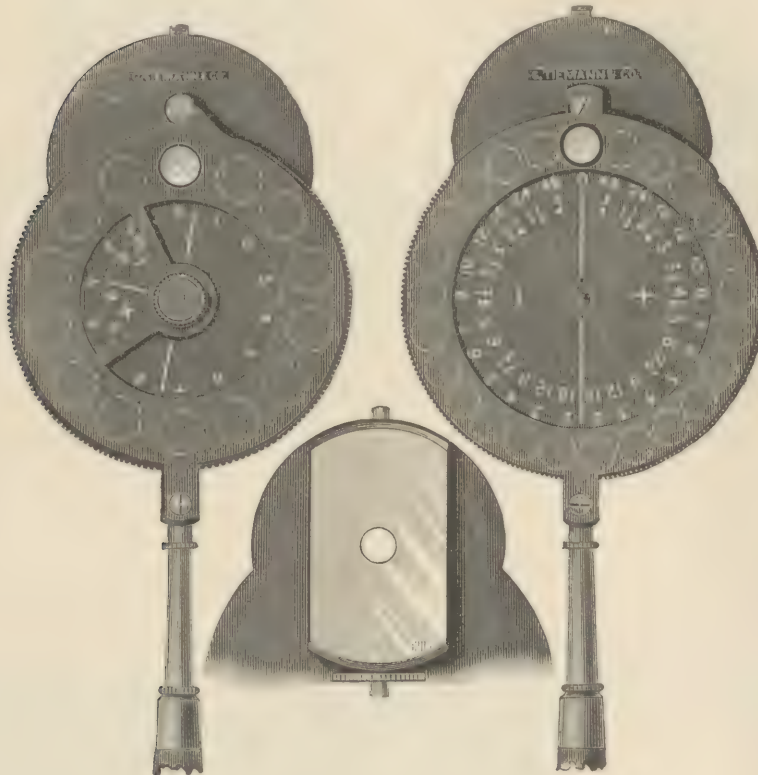
Number of Glass.	Obtained by Combination of.	Shortening	Elongation.	Number of Glass.	Obtained by Combination of.	Shortening.	Elongation.
± 2	....	6.12	5.08	± 6	....	1.91	1.80
$\pm 2\frac{1}{5}$	$\pm 2 \mp 17$	4.93	4.23	$\pm 6\frac{2}{7}$	$\pm 6 \mp 48$	1.62	1.56
$\pm 2\frac{1}{4}$	$\pm 2 \mp 10$	4.80	4.14	± 8	....	1.42	1.36
$\pm 2\frac{3}{8}$	$\pm 2 \mp 8$	4.27	3.90	± 10	....	1.13	1.09
± 3	....	3.95	3.49	± 12	....	0.94	0.91
$\pm 3\frac{1}{8}$	$\pm 3 \mp 48$	3.68	3.28	± 14	....	0.80	0.78
$\pm 3\frac{2}{7}$	$\pm 3 \mp 20$	3.32	2.99	± 17	....	0.66	0.65
$\pm 3\frac{3}{11}$	$\pm 3 \mp 14$	3.05	2.78	± 20	....	0.56	0.55
± 4	....	2.91	2.65	± 24	....	0.467	0.459
$\pm 4\frac{1}{5}$	$\pm 4 \mp 33$	2.63	2.42	± 33	....	0.339	0.335
± 5	$\pm 4 \pm 20$	2.31	2.14	± 48	....	0.232	0.230
$\pm 5\frac{3}{8}$	$\pm 4 \mp 14$	2.05	1.92	....	....	....	....

OPHTHALMIC.

OPHTHALMOSCOPES. (Continued.)

FIG. 1750.—Loring's
Single Disk Upright Image
Ophthalmoscope.

FIG. 1751.—Loring's
Double Disk Upright Image
Ophthalmoscope.



* * * The latest modification of the ophthalmoscope, adopted by Dr. Loring, is a successful attempt to combine two essential points, viz. : first, that the glass should have a diameter of not less than six millimetres ; and, secondly, to have a sufficiently large number of glasses. This is done by a single disk and the segment of a disk, the latter being the quadrant of a circle.

The single disk contains sixteen glasses, on the metric system, the plus being numbered in *white*, and the minus in *red*. The first row of numbers, or that just beneath the glass, shows the *real* value of the glass ; the second, or inner row, shows the results of the combination when the quadrant is in position. The quadrant rotates immediately over the disk and around the same centre, and contains four glasses — .5 — 16. and + .5 + 16.

When not in use, the quadrant is beneath the cover. The instrument then represents a simple ophthalmoscope with sixteen perforations, the series running with an interval of 1. D, and extending from 1. to 7. plus, and from 1. to 8. minus.

This is ample for all ordinary work, as the interval of 1. D is as close as even an expert usually desires, and can, with a little experience, be used for even very minute discrepancies. For if, in a given case, the fundus is seen distinctly with 1. D, and a little to spare, while 2. D blurs the picture, we know at once that the refraction must be between the two, or 1.5 D. If, however, for any reason we wish to prove this conclusion, we can bring up 0.5 D. From this glass we get successive half-dioptics from 1. to 8. plus and from 1. to 9. minus. In this way we have, so to speak, a fine and a coarse adjustment, as in the microscope.

If the higher numbers are desired, these are obtained by combination with those of the quadrant. These progress regularly up to 16. D, every dioptric being marked upon the disk ; above this, up to + 23. D and — 24. D, we have to simply add the glass which comes beneath the 16. D, turning always in the same direction.

By the various combinations a total series of sixty-five glasses can be obtained.

OPHTHALMIC.

OPHTHALMOSCOPES. (Continued.)

Beginning with 0, and revolving always from
left to right, we obtain :

Beginning with 0, and revolving always **from**
right to left, we obtain :

PLUS.		MINUS.	
	0		1
	1		2
	2		3
	3		4
	4		5
	5		6
	6		7
	7 Bring up + 16		8 Bring up — 16
+ 16 — 8 =	8	— 16 + 7 =	9
" — 7 =	9	" + 6 =	10
" — 6 =	10	" + 5 =	11
" — 5 =	11	" + 4 =	12
" — 4 =	12	" + 3 =	13
" — 3 =	13	" + 2 =	14
" — 2 =	14	" + 1 =	15
" — 1 =	15	" + 0 =	16
" — 0 =	16	" — 1 =	17
" + 1 =	17	" — 2 =	18
" + 2 =	18	" — 3 =	19
" + 3 =	19	" — 4 =	20
" + 4 =	20	" — 5 =	21
" + 5 =	21	" — 6 =	22
" + 6 =	22	" — 7 =	23
" + 7 =	23	" — 8 =	24

Thus, with the superposition of a *single* glass (+ 16. or — 16.), and with an uninterrupted rotation, a series is obtained of successive Dioptries from 1. to 23. plus, and from 1. to 24. minus.

With the use of the 0.5 we can obtain, in addition, the following series, with an interval of half a dioptric :

+ 0.	— 0.5
+ 0.5	— 1.
+ 1.	— 1.5
+ 1.5	— 2.
+ 2.	— 2.5
+ 2.5	— 3.
+ 3.	— 3.5
+ 3.5	— 4.
+ 4.	— 4.5

By a simple displacement of the quadrant the instrument becomes a single disk ophthalmoscope.—See "Trans. Fifth Intern. Ophthal. Congress," 1876, and "Trans. Amer. Ophth. Soc." 1878.

Dr. H. T. Noyes has described, in his own "Treatise on Diseases of the Eye," 1881, pp. 28-29, an ophthalmoscope with certain modifications, based upon Loring's latest model, devised for the purpose of putting at command, in rapid succession, the full series of glasses which may be required. The mechanism by which this is effected is by cog wheels, and there are two disks carrying lenses. The mirror, besides swinging in the trunnions, may be rotated in a circular direction, and thus assume any angle. The front disk is moved by the lowest wheel, and the back disk by the upper and exposed wheel. There is a spring clip on the back of the instrument, which will carry a cylindrical glass. It gives command of a complete set of spherical glasses, both positive and negative, seventy-six in number.—"Soelberg Wells' Diseases of the Eye." Bull's Am. ed., 1883, pp. 738-740.

Knapp's Metric System Ophthalmoscope (Fig. 1752).

It contains thirty-two glasses, running from 0.5 Dioptric to 18 Dioptries, positive and negative.

OPHTHALMIC.

OPHTHALMOSCOPES AND ACCESSORIES.

FIG. 1752.—Knapp's Metric System Ophthalmoscope.

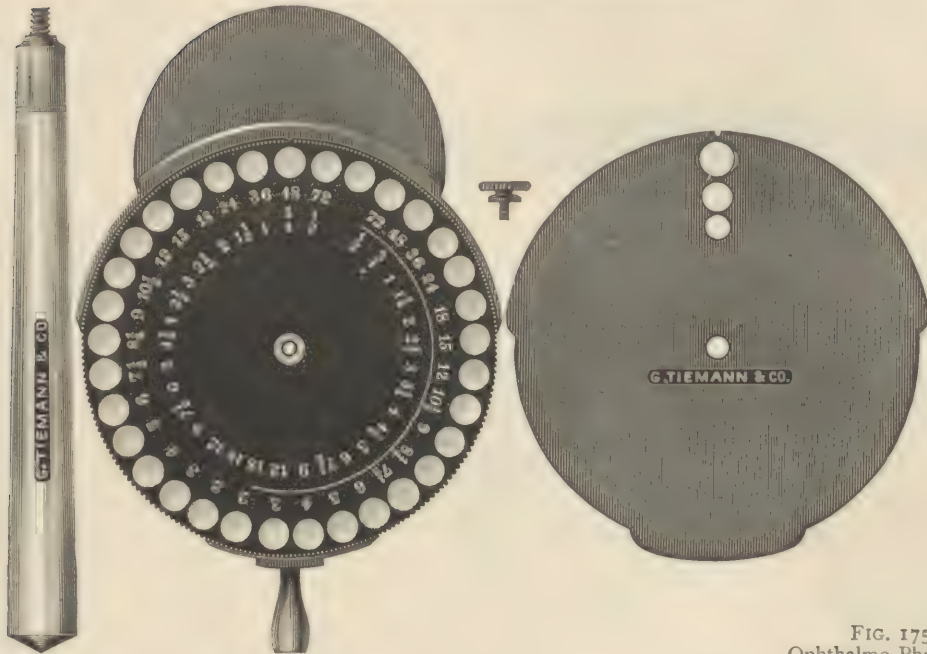


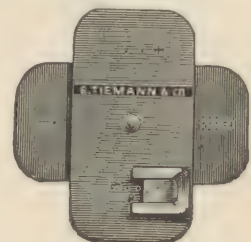
FIG. 1753.—Nacht's Trial Set.



FIG. 1754.
Ophthalmo-Phantome.



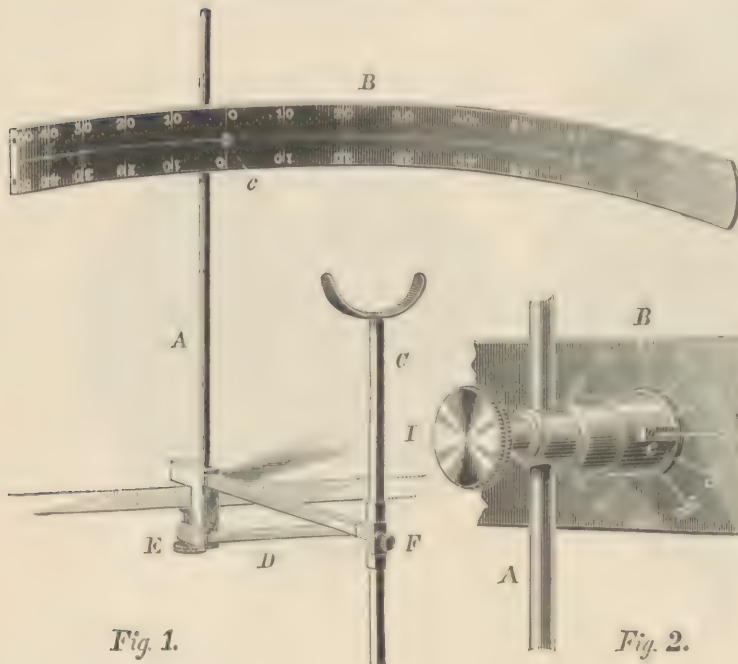
FIG. 1755.
Thompson's Optometer.



OPHTHALMIC.

PERIMETERS, PUPILLOMETERS, STRABISMOMETERS, TEST TYPES.

FIG. 1756.—Carmalt's Perimeter.



This instrument, described fully in the "Transactions of the Fifteenth Annual Meeting of the American Ophthalmological Society," 1879, is a modification of Foerster's, but at a very much less cost. It consists of a brass arc *B*, cast accurately upon a circle of 35.5 cm. (14 in.) radius, revolving smoothly about the axis *c*.

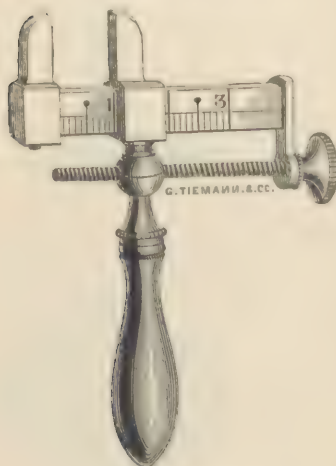
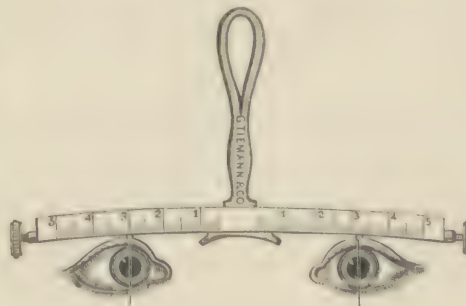
A portion of the long arm unships and fits on the short arm for the examination of each eye. The short lines across the face of the arc, Fig. 2, represent, as the arc is revolved, concentric circles situated at 10° apart up to 90° , and the radiating lines shown in Fig. 2, represent the meridians of the globe of the eye at intervals of 30° . Both are numbered to correspond with a diagrammatic chart of the visual field (which may be procured with the instrument) drawn to a scale of 1 mm. to each degree of the visual field. The centre of the chart corresponds to the macula lutea.

Description.

FIG. 1.—*A*, upright shaft upon which the brass arc slides; *B*, arc 35.5 cm. radius, embracing 140° of a circle; *C*, chin-rest, sliding up and down in horizontal brace, *D*, with thumb-screw for fixation at *F*. The horizontal brace, *D*, is arranged with slide to be just 35.5 cm. long, so that the eye is exactly at the centre of the arc, *A*; *E*, string-clamp for attachment of whole to table or bracket against the wall; *c*, axis about which arc, *A*, revolves, nickel-plated for fixation of eye.

FIG. 2.—Reverse end of axis, showing radiating lines for meridian of eye, as indicated on chart to accompany instrument.

FIG. 1757.—Pupillometer.

FIG. 1758.
Galezowsky's Binocular Strabismometer.FIG. 1759.
LAWTON'S
Strabismometer.

SNELLEN'S, JAEGER'S, &C., TEST TYPES.

TEST TYPES FOR COLOR BLINDNESS.

OPHTHALMIC.

PALPEBRAL.

For Tumors, Versions, and other Affections of the Lids. Entropium, Ectropium, Ptosis and Trichiasis Ciliorum.

FIG. 1760.—Knapp's Entropium Forceps.

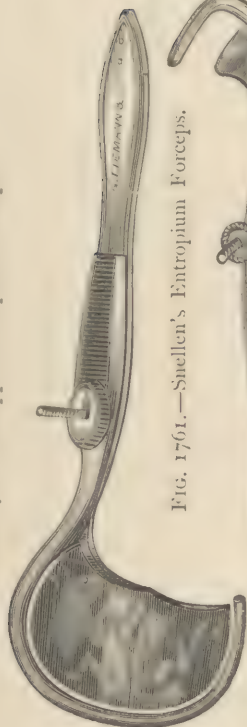


FIG. 1761.—Snellen's Entropium Forceps.



FIG. 1762.—Rochrich's Entropium Forceps.

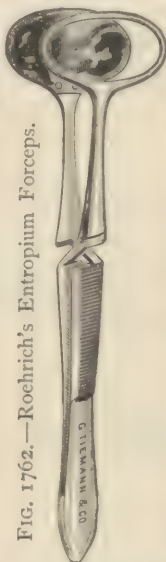


FIG. 1763.—Tiemann & Co.'s Entropium Forceps.

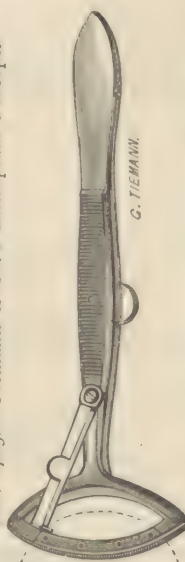


FIG. 1764.—Desmarre's Entropium Forceps.

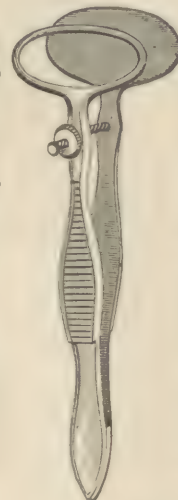


FIG. 1765.—Laurence's Eyelid Tourniquet.

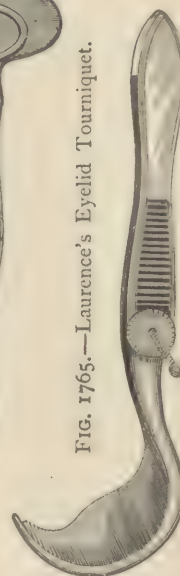


FIG. 1766.—Cross-Bar Entropium Forceps.

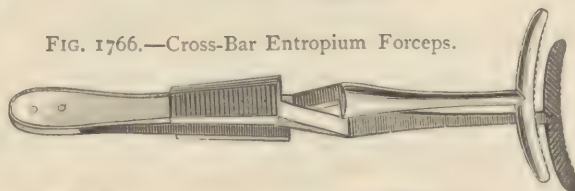


FIG. 1767.—Tiemann & Co.'s Entropium Forceps.

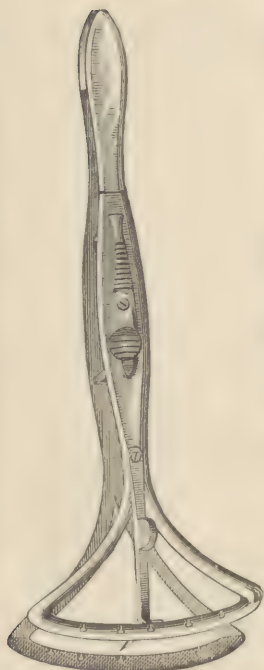


FIG. 1768.—Proust's Entropium Forceps.

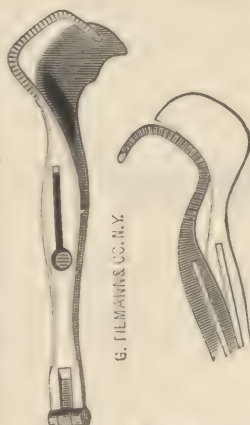


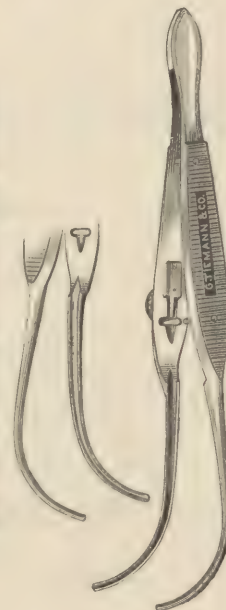
FIG. 1769.—Stoke's Eyelid Compressor.



FIG. 1770.—Jäger's Plate Lid-Holder.



FIG. 1771.—Carron de Villard's Lid Forceps.



OPHTHALMIC.

PALPEBRAL.

For Tumors, Versions, and other Affections of the Lids.

FIG. 1777.—Scalpel for Operating upon the Lids.



FIG. 1778.—Small Size Scalpel.



FIG. 1772.—Ratti's Trichiasis Forceps.

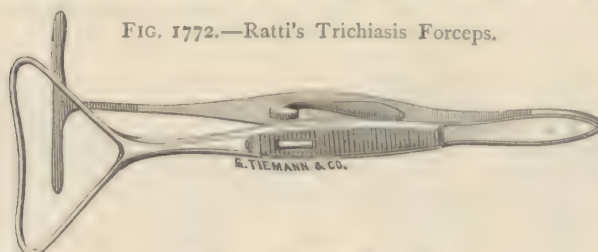


FIG. 1773.—Cilia Forceps.



FIG. 1774.—Piffard's Epilating Forceps.



FIG. 1775.—Gruening's Epilating Forceps.

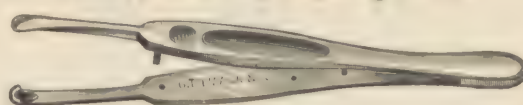
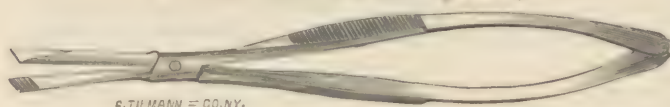


FIG. 1776.—Henry's Depilating Forceps.



G. TIEMANN & CO. N.Y.

FIG. 1781.—Knapp's Needle-Holder.



FIG. 1784.—Fine Curved and Half-Curved Needles.



See PIFFARD'S MILIUM NEEDLE and IRIDO-PLATINUM NEEDLE, page 121.
FOX'S NEEDLE-HOLDER, FOR REMOVING HAIR BY ELECTROLYSIS, see page 121.

FIG. 1782.—Sand's Needle Forceps.



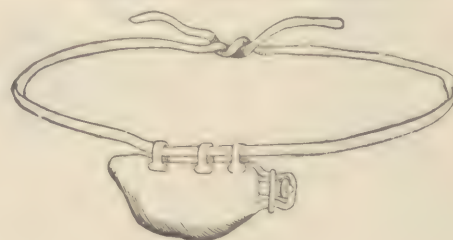
FIG. 1783.—Prout's Needle Forceps.



G. TIEMANN & CO

FIG. 1785.

Turnbull's Ice Bag, for the application of cold to the eye, to subdue inflammation.



OPHTHALMIC.

LACHRYMAL.

Probes, Dilators, Catheters, Styles, for Strictures of the Lachrymal Passages.

FIG. 1786.—Anel's Probes.



FIG. 1787.—Bowman's Set of Nos. 1, 2, 3, 4, 5, 6, 7, 8, Probes.

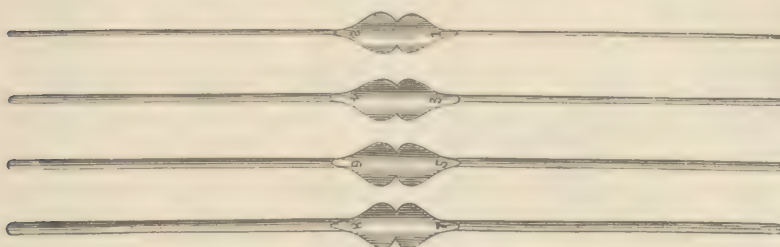


FIG. 1788.—Weber's Graduated Dilator.



FIG. 1789.—Williams' Set of Lachrymal Probes.

a, b. Probes. *c.* Dilator. *d, e.* Styles.

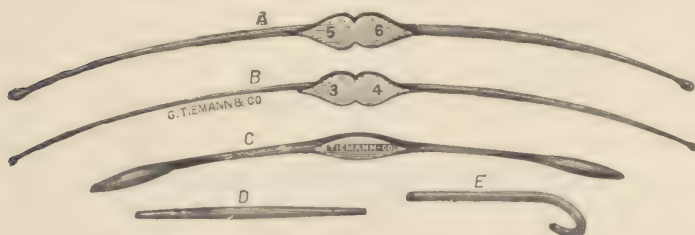


FIG. 1790.—Brewster's Lachrymal Cupped Sound.



FIG. 1791.—Probes for the treatment of Strictures of the Nasal Duct.

By SAMUEL THEOBALD, M. D.

Transactions of the Medical and Chirurgical Faculty of Maryland, Baltimore, 1877.



No. 1.— $\frac{1}{4}$ m.m.
2.— $\frac{1}{2}$ m.m.
3.— $\frac{3}{4}$ m.m.
4.—1 m.m.
5.— $1\frac{1}{4}$ m.m.

No. 6.— $1\frac{1}{2}$ m.m.
7.— $1\frac{3}{4}$ m.m.
8.—2 m.m.
9.— $2\frac{1}{4}$ m.m.
10.— $2\frac{1}{2}$ m.m.
11.— $2\frac{3}{4}$ m.m.

No. 12.—3 m.m.
13.— $3\frac{1}{4}$ m.m.
14.— $3\frac{1}{2}$ m.m.
15.— $3\frac{3}{4}$ m.m.
16.—4 m.m.

FIG. 1792.—Styles and Lachrymal Canula.



Styles made of gold, silver, aluminium, hard rubber and lead, solid and canulated; also lead wire.

FIG. 1793.—Galezowsky's Canalicula Dilator.



FIG. 1794.—Wecker's Lachrymal Canula.

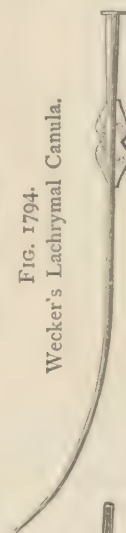


FIG. 1795.—Levi's Probe.

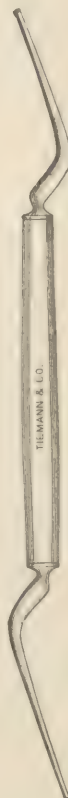


FIG. 1796.—Spier's Lachrymal Catheter.



OPHTHALMIC.

LACHRYMAL.

Probes, Directors and Knives, for Division of Strictures of the Lachrymal Passages and for Fistula Lachrymalis.

FIG. 1805.—Noyes' Plain Canalicula Knife.



FIG. 1797.—Weber's Half Curved Canalicula Knife.



FIG. 1806.—Noyes' Movable Blade Canalicula Knife.



FIG. 1798.—Weber's Curved Canalicula Knife.



FIG. 1807.—Bowman's Director.

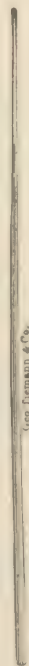


FIG. 1799.—Beaumont's Concealed Canalicula Knife.



FIG. 1808.—Bowman's Canalicula Knife.



FIG. 1800.—Jaeger's Bistoury Caché for the Canalicula.



FIG. 1809.—Agnew's Canalicula Knife.



FIG. 1810.—Prout's Lachrymal Knife.



FIG. 1801.—Greenslade's Concealed Canalicula Knife.



FIG. 1811.—Liebreich's Probe and Fistula Knife.



FIG. 1802.—Girard Teulon's Canalicula Instrument.



FIG. 1812.—Petit's Fistula Lachrymalis Knife.



FIG. 1803.—Stilling's Knife for stricture in the lachrymal passages.



FIG. 1813.—Packer's Fistula Lachrymalis Knife.



FIG. 1804.—Noyes-Stilling's Knife.

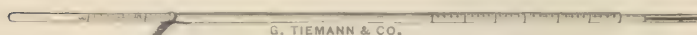


OPHTHALMIC.

LACHRYMAL.

For Cauterizing the Nasal Duct and Obliterating the Sac.

FIG. 1815.—Gensoul's Canula for Cauterizing the Nasal Duct.



See GALVANO CAUTERY, page 37.
THERMO CAUTERY, page 39.

FIG. 1817.—Knapp's Caustic Holder.



FIGS. 1818 and 1819.—Desmarre's Cautery Iron and Many-Pronged Hook, for Obliterating the Sac.

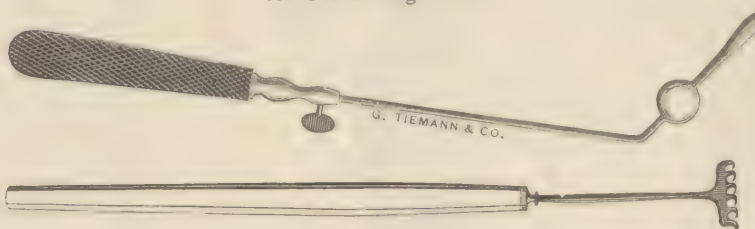
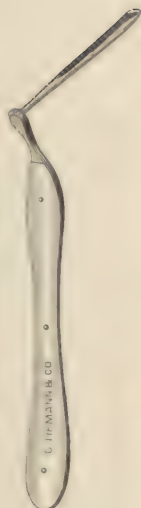


FIG. 1816.—Manfredi's Speculum.



FIG. 1814.—Noyes' Lachrymal Gouge.



LACHRYMAL SYRINGES, EYE DOUCHES AND BATHS.

FIG. 1820.—Anel's Silver Eye Syringe—Gold and Silver Points.

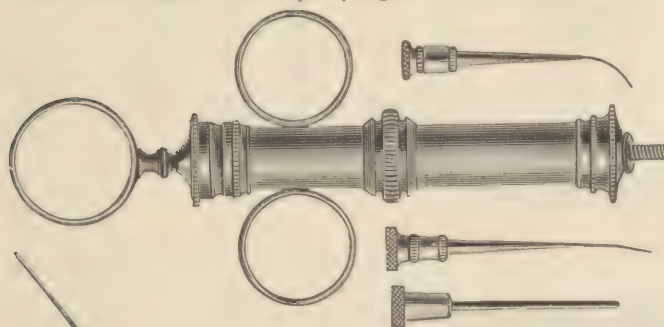


FIG. 1824.—Agnew's Eye Douche.



FIG. 1821.
McFarlan's Lachrymal Syringe.



FIG. 1825.
Stopcock for Eye Douche.



FIG. 1822.
Liebold's Subpalpebral Syringe.

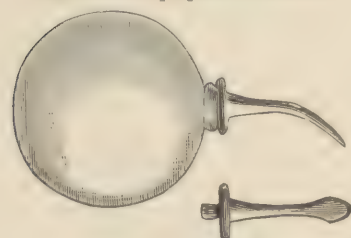


FIG. 1823.—Agnew's Lachrymal Syringe.

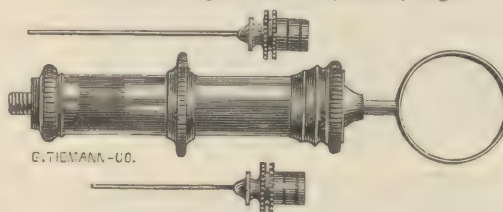
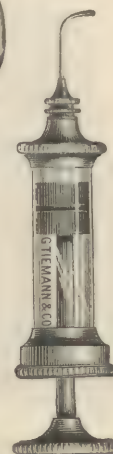


FIG. 1826.—Knapp's Lachrymal Syringe.



See also DROP GLASS, and EYE BATH, page 150.

OPHTHALMIC.

FOR REMOVING FOREIGN BODIES.

FIG. 1827.—Drop Glass for the Eye.

FIG. 1840.—Gruening's Magnet.
For Removing Particles of Steel or Iron from the Eye.

DR. GRUENING'S MAGNET.

It consists of a series of bar magnets, united at one end by an armature of malleable iron, on which is mounted a needle of soft iron, 32 mm. in length and 1 m. in width. This magnet will easily sustain a weight of 15 grammes and will promptly extract splinters and particles of iron weighing from 1 to 50 centigrammes from the vitreous. Should it be inexpedient to extract the foreign substance through the wound already existing in the sclerotic, Dr. Gruening would draw the splinter to a favorable site and extract through an incision in the sclera. A splinter brought to the original wound might present transversely, and so render its extraction difficult. With some dexterity in manipulation, one end of the splinter could be attached to the magnetic needle and the foreign body could then be removed with facility.—*N. Y. Med. Journal*, Sept. 1880.

OPHTHALMIC.

SPECULA AND LID HOLDERS.

For controlling and keeping the Lids apart and exposing the Ball for an operation.

FIG. 1841.—Plain Wire Eye Speculum.



FIG. 1843.
Noyes'
Plain Eye
Speculum.



FIG. 1842.—Graefe's Eye Speculum.



FIG. 1844.
Noyes' Improved Eye Speculum.

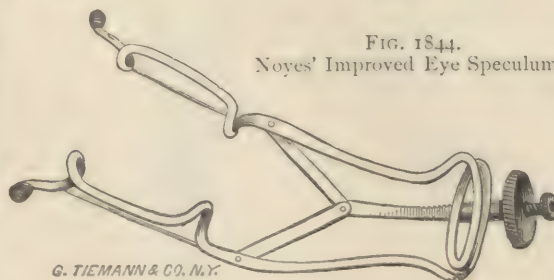


FIG. 1845.—Galante's
Eye Speculum.

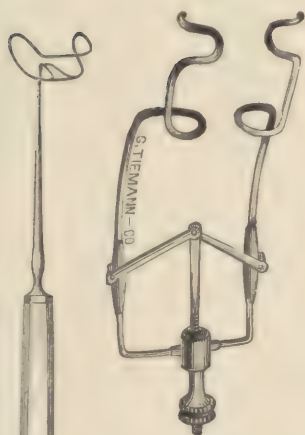


FIG. 1846.—Landolt's Eye Speculum.



FIG. 1847.—Schwarka's Eye Speculum.



FIG. 1848.—Liebold's Eye Speculum.

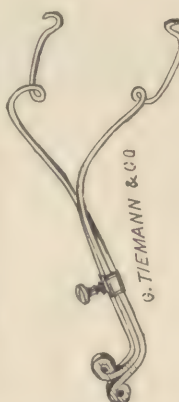


FIG. 1850.—Liebreich's
Eye Speculum.

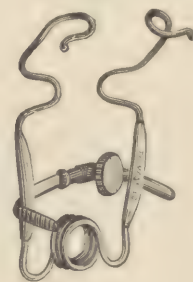


FIG. 1851.—Critchett's Eye Speculum.
Over the nose.

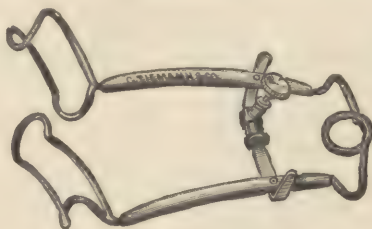


FIG. 1852.—Critchett's Eye Speculum.
Over the temple.



FIG. 1849.—Noyes' Eyelid Retractor.



FIG. 1853.
Hart's Eye Speculum.

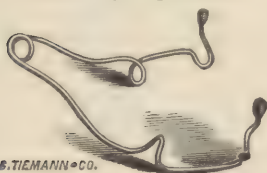
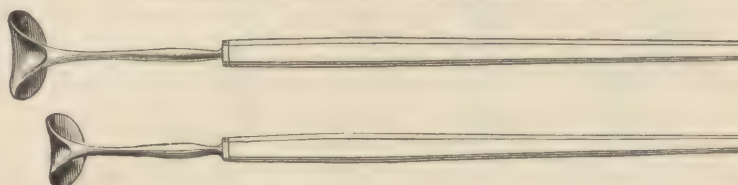


FIG. 1854 and 1855.—Desmarre's Eyelid Retractors.



OPHTHALMIC.

SPECULA, FIXATORS AND OPHTHALMOSTATES.

To Steady the Eyeball for an Operation.

FIG. 1856.—Bowman's Eye Speculum.

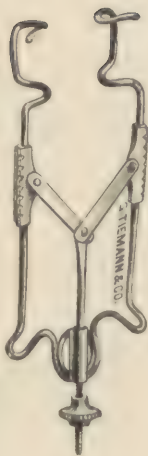


FIG. 1861.—Noyes' Fixation Forceps.



FIG. 1857.—Dudley's Fixation Forceps.



FIG. 1858.—Carron de Villard's Fixation Forceps.

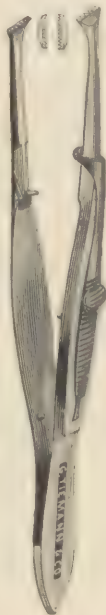


FIG. 1859.—Fixation and Tumor Forceps.



FIG. 1860.—De la Roza's Fixation Forceps.



FIG. 1862.—Graefe's Fixation Forceps.



FIG. 1863.—Curved Fixation Forceps.

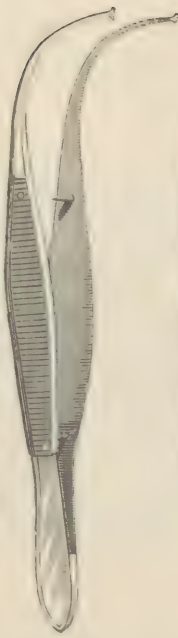


FIG. 1864.—Jaeger's Ophthalmostate.

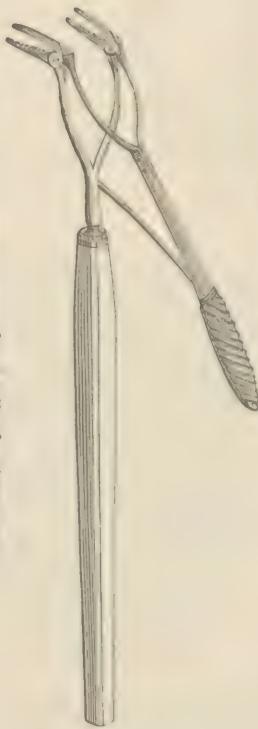


FIG. 1865.—Noyes' Ophthalmostate.



FIG. 1866.—Pamard's Pique, for Fixation.



FIG. 1867.—Three-Pointed Ophthalmoscope.



FIG. 1868.—Double Hook, for Fixation.



OPHTHALMIC.

SURGICAL ANATOMY OF THE MUSCLES OF THE EYE.

In reference to Operations performed and the Instruments employed for the Relief of Strabismus.

* * * The movements of the globe of the eye are performed around three axes, an antero-posterior, a transverse and a vertical. These motions are effected by six muscles, four straight and two oblique. The four straight muscles arise around the foramen opticum behind the globe, and, enveloping it, pass forward and are inserted into its anterior hemisphere, about one or two lines from the circumference of the cornea, a favorable arrangement for the movements of rotation, which they are destined to effect. These four muscles are:

1st. *The superior rectus*, situated at the upper part of the orbit, beneath the levator palpebræ superioris, it raises the pupil by turning the eye upon its transverse axis.

2d. *The inferior rectus*, diametrically opposed to the preceding, also turns the eye upon its transverse axis, by drawing down the pupil. It passes between the globe and the inferior oblique which is inserted above its external border.

3d. *The internal rectus*, lying along the internal wall of the orbit, turns the eye on its vertical axis, and draws the pupil inwards.

4th. *The external rectus*, lying along the external wall of the orbit, is the antagonistic of the preceding; its insertion into the sclerotica is a little nearer the cornea than that of either of the other recti muscles.

The two oblique muscles turn the eye around its antero-posterior axis:

1st. *The superior oblique* arises around the optic foramen, from thence it passes forwards and inwards to the internal orbital process of the frontal bone, where it passes through a fibrous ring, which forms a species of pulley. After leaving this ring it passes from within outwards beneath the superior rectus, and is inserted into the posterior hemisphere of the globe; when it contracts, it draws the pupil downwards and upwards.

2d. *The inferior oblique* arises along the inner edge of the border of the orbit; it passes beneath the globe from within outwards, and is inserted by a large tendon into the posterior hemisphere of the eyeball, below the insertion of the superior oblique, to which action its muscle is opposed.

Three different nerves supply these muscles: *the motores oculorum*, or third pair, give branches to the superior, internal and inferior recti, and the inferior oblique; *the pathetici*, or fourth pair, supply the superior oblique alone; and *the abducentes*, or sixth pair, the external rectus.

Orbital aponeurosis.—The eyeball is retained in the middle of the orbit by the orbital aponeurosis. Suspended in this fibrous capsule, it executes with rapidity its movements of rotation, without sustaining any general displacement, which would destroy in the two globes that simultaneousness of motion so necessary to distinctness of vision. This aponeurosis, after lining the orbit and supplying the palpebral ligaments, is reflected upon the globe, envelopes its two posterior thirds, furnishes sheaths for its muscles, and finally terminates posteriorly upon the neurilemma of the optic nerve.

It is adherent anteriorly to the muscles at the point where they leave it to be inserted into the sclerotica. This arrangement does not always allow each muscle to act independently; it accounts for those movements which still continue after the section of the muscle itself, the movements of the eyeball depending in these cases upon those of the orbital aponeurosis.

Strabismus consists of a loss of parallelism between the two axes of vision.

The indications for and against an operation are derived from the causes which produce the disease, the most frequent of which is, perhaps, contraction of the muscle corresponding to the direction of the squint.

STRABOTOMY.

Earlier Modes of Operating. Miotomy.

Strohmeyer's method, which he recommended in 1829. * * * The sound eye being closed, the patient is directed to carry the affected eye as far as possible in the direction opposite to that which it usually retains. If the strabismus is inwards, a fine double hook is inserted into the inner margin of the ocular conjunctiva, and confined to an assistant, who draws the eye outwards; the conjunctiva being raised up with forceps, is divided with a cataract knife, the incision being directed towards the inner angle of the eye; the traction outwards is then increased until the internal rectus muscle appears; a fine probe is then passed beneath the latter, and it is divided with the curved scissors or with the knife with which the conjunctiva was opened.

Sedillot's Method.—In converging strabismus, to turn the eye outwards, we take up the conjunctiva with a hook (Fig. 1873); another hook is then introduced along the border of the sclerotica, and a little within the cornea; an assistant takes charge of this last hook while the surgeon withdraws the first. Raising up a fold of the conjunctiva a little to the inner side of the hook with an ordinary pair of forceps, we divide it with a single cut of the scissors, and then cutting one after another the fibro-cellular filaments which present themselves, we soon come to the muscle, whose reddish color contrasts strongly with the sclerotica. After carefully isolating the muscle, we slip a blunt hook beneath it, and raising it slightly, divide it with the scissors. In slight cases of strabismus, we have intentionally left a portion of the

OPHTHALMIC.

STRABOTOMY.

For Operating on the Ocular Muscles and their Tendons, to Correct Diplopia and the Deformity of Squint.

FIG. 1869.—Wecker's Double Strabismus Hook.



FIG. 1870.—Theobald's Crochet Strabismus Hook.



FIG. 1871.—Graefe's Large Strabismus Hook.



FIG. 1872.—Graefe's Small Strabismus Hook.

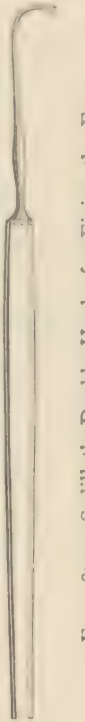


FIG. 1873.—Sedillot's Double Hook, for Fixing the Eye.

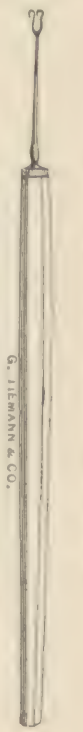


FIG. 1874.—Wecker's Strabismus Hook.



FIG. 1875.—Critchett's Strabismus Hook.

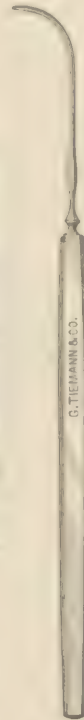


FIG. 1876.—Strabismus Hook-Bistoury.



FIG. 1877.—Curved Strabismus Forceps.



FIG. 1878.—Probe-Pointed Curved Strabismus Scissors.

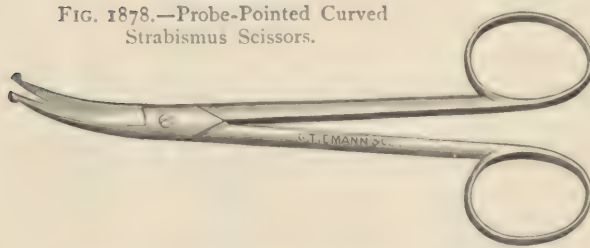


FIG. 1879.—Blunt-Pointed Curved Strabismus Scissors.

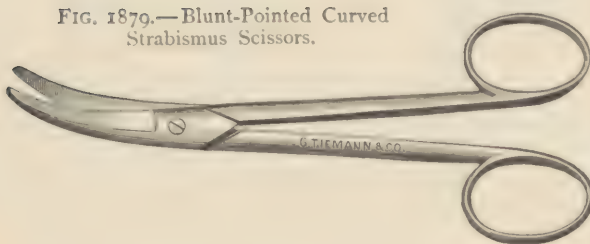
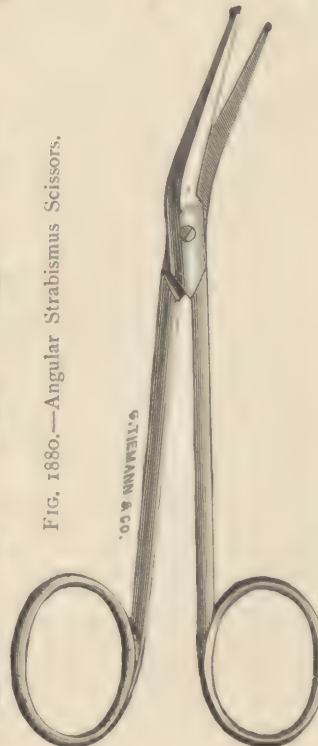
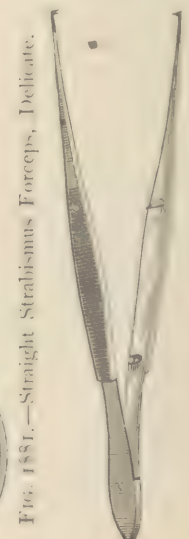


FIG. 1880.—Angular Strabismus Scissors.



AGNEW'S
TENACULUM
is like Fig. 1871,
with an eye near the
point for ligature.



OPHTHALMIC.

STRABOTOMY.

Earlier Modes of Operating. Miotomy. (Continued.)

muscular fibres undivided, and yet obtained a successful result by covering the sound eye for four or five days, and forcing the patient to turn the operated eye outwards, to see the objects through a circular opening in a piece of plaster.

Subconjunctival Operation.—Guérin's Method: Take up with the hooks a fold of conjunctiva, and entering a Z-shaped tenotome (Fig. 1876) at its base, introduce it between the muscle and the sclerotic; turn the cutting edge of the knife from behind forward and divide the muscle with a slight sawing motion.

By this method Guérin proposed to prevent the contact of the air with the wound, and to procure for it, as for all subcutaneous wounds, the benefits of an immediate and rapid reparation.—From "Bernhard and Huetten's Manual of Operative Surgery." Am. Ed., by Van Buren and Isaacs.

Tenotomy. The New Operations.

* * * The principle of Von Græfe's new operation consists in a very careful division of the tendon close to its insertion, with the smallest possible amount of laceration of the subconjunctival tissue, and the tendinous processes of the capsule of Tenon. We diminish the power of the muscle by giving it a more backward insertion, but we, at the same time, preserve its length intact. Our object is only to weaken the muscle, and not to render it more or less impotent.

Before proceeding to consider this method of operating we will, however, dwell for a moment upon the anatomical relations of the muscles of the eye with the ocular sheath. Commencing at the optic foramen, and loosely embracing the optic nerve, the sheath expands and passes on to the eyeball, which it encloses like a capsule. It is loosely connected with the sclerotic with connective tissue—so loosely as to allow of the free rotation of the globe within it. At the equator of the eyeball it is pierced by the tendons of the oblique muscles, and more anteriorly by the tendons of the four recti muscles, with which it becomes blended; being finally on, rather than inserted into, the sclerotic, close to the cornea. The posterior portion of the sheath, up to the passage of the tendons, has been called the "capsule of Bonnet;" the anterior portion, from the passage of the tendons to its insertion in the sclerotic, having been designated the "capsule of Tenon." On piercing the capsule the tendons of the recti muscles become connected with it by slight cellular processes, sent forth from the capsule. These processes prevent the too great retraction of the muscle after the division of its tendon, which would be followed by a great loss of power. It is, therefore, of much consequence that these connecting processes should not be severed by the tendon being divided too far back, or be lacerated by rude and careless manipulations with the strabismus hook. Von Græfe has, moreover, pointed out that the result may be unfavorable, even although the tendon has been divided anterior to these fibres, as the sheath of the tendon becomes thickened from the point at which it passes through the capsule, and this thickening extends nearly up to its insertion. If the tendon is, therefore, not divided sufficiently close to its insertion, it is apt to retract within this thickened sheath, and this retraction will, in many cases, prevent its reunion with the sclerotic.

In the old operation the muscle was divided far back—frequently even posterior to its passage through the capsule—and it was, consequently, rendered so powerless that the eyeball could not be moved in this direction; its opponent acquired a corresponding preponderance of power, giving, but too frequently, rise to a secondary squint in the opposite direction. Hence, the popular dread of the operation, "lest the eye should go the other way." But such an unfortunate result is not to be feared if the surgeon performs the operation with care and circumspection, and is thoroughly conversant with the theoretical part of the subject.

Von Græfe's Method.—Patient under an anæsthetic. The eyelids kept apart by a spring speculum (page 151), or, if this proves not sufficiently strong, by the retractors (Figs. 1854, 1855). An assistant everts the eye with a pair of forceps, taking care to do so in the horizontal direction, without rotating the eyeball on its axis, otherwise the horizontal position of the internal rectus will be changed. The operator then seizes, with a pair of finely-pointed forceps (Figs. 1877 or 1881), a small but deep fold of the conjunctiva and subconjunctival tissue close to the edge of the cornea, and about midway between the centre and lower edge of the cornea, and about midway between the centre and lower edge of the insertion of the internal rectus. He next snips this fold with the scissors, which should be bent on the flat and blunt-pointed (Figs. 1878, 1879), and, burrowing beneath the subconjunctival tissue in a downward and inward direction, makes a funnel-shaped opening beneath the subconjunctival tissue—this being, however, done very carefully—so as not to divide it to too great an extent. If the subconjunctival tissue is thick and strong it will be better, first, to take up a small fold of the conjunctiva only, to open this, and then seizing the subconjunctival tissue, to divide the latter. The squint-hook, which should be bent at a right angle, and have a slightly bulbous point (Figs. 1871, 1772), is then to be passed through the opening to the lower edge of the tendon. Its point being pressed somewhat firmly against the sclerotic, the hook is to be turned on the point and slid upwards beneath the tendon, as close to its insertion as possible, and the whole of the expanse of the tendon caught up. The operator must be careful not to direct the point of the hook upwards and outwards, otherwise it may perforate the fibres of the tendon, and only a portion of the latter be caught up. When the tendon has been secured on the hook, the conjunctiva, which covers its upper portion, may be gently

OPHTHALMIC.

STRABOTOMY.

Tenotomy. The New Operations. (Continued.)

pushed off with the points of the scissors, so as to expose the tendon, which is then to be carefully snipped through with the scissors as closely as possible to its insertion. When it has been completely cut through the conjunctiva it is to be slightly elevated on the point of the hook and a smaller hook passed upwards and downwards to ascertain whether the lateral expansions of the tendon have been divided. Should a few fibres remain they must be divided, and the surgeon should again ascertain whether any others are still present, for if a few fibres only remain, they would suffice to spoil the effect of the operation.—“Soelberg Wells’ Diseases of the Eye,” p. 708. Am. Ed., 1883.

Critchett’s Subconjunctival Operation.—The patient having been placed under the influence of an anæsthetic, and the eyelids kept apart by the stop speculum, he seizes a small fold of the conjunctiva and subconjunctival tissue at the lower edge of the insertion of the rectus muscle, and with a pair of blunt-pointed, straight scissors, makes a small incision at this point through these structures. The lower edge of the tendon, close to its insertion, is now exposed. A blunt hook (Fig. 1875) is next to be passed through the opening in the subconjunctival tissue beneath the tendon, so as to catch up the latter and render it tense. The points of the scissors, but slightly opened, are then to be introduced into the aperture, and one point passed along the hook, behind the tendon, the other in front of the tendon, between it and the conjunctiva, and the tendon is then to be divided close to its insertion by successive snips of the scissors. A small counterpuncture may be made at the upper edge of the tendon, to permit of the escape of any effused blood, and thus prevent its diffusion beneath the conjunctiva.—BOWMAN.

In this operation the tendon, owing to the cutting action of the scissors, is apt to slip off the hook before it has been completely divided. To remedy this Dr. Theobald has devised the “crochet hook” (Fig. 1876), which Dr. Noyes modified.

* * * *Liebreich’s Method*, based upon a different view of the anatomical relations of the conjunctiva, subconjunctival tissue, and the capsule of Tenon to the muscles of the eye. He considers the capsule of Tenon as divided into two portions—an anterior and a posterior—the division being formed at the point where the recti muscles pierce it from without inwards: the capsule being at this point so closely connected with the muscles as to render any displacement between the two impossible. The posterior half of the capsule, with its smooth, firm, inner surface, forms a cup, in which the eyeball moves as freely as the head of a joint in the socket. The close connection between the muscles and the posterior half of the capsule is increased by sheath-like processes, which run backwards from the outer surface of the capsule towards the orbit, and which are, for a certain distance, closely connected with the muscles. But there are no sheath-like processes between the inner portion of the posterior capsule and the sclerotic. The anterior half of the capsule of Tenon adheres to the upper surface of the muscle and is intimately connected with it. But Liebreich denies the presence of sheath-like processes derived from the capsule, where they pierce the latter, and accompanying the muscles as far as their insertion. He states, moreover, that the “caruncle,” together with the semilunar fold, rests upon the band-like ligament, which passes from the capsule of Tenon towards the edge of the orbit. Now, when the internal rectus is contracted, and the eye rolled inwards, this band is rendered tense, and the caruncle, which is fixed to it, is consequently drawn towards the inner edge of the orbit. But the outer edge of the caruncle, together with the semilunar fold, and an adjoining portion of the conjunctiva, are drawn backwards into a furrow. This intimate connection between the muscle, capsule and caruncle is the reason of the sinking of the caruncle and semilunar fold, which is occasionally observed after an extensive division of the internal rectus. To obviate these disadvantages, and yet to obtain a considerable effect, Liebreich operates in the following manner: “If the internal rectus is to be divided, I raise with a pair of forceps a fold of conjunctiva at the lower edge of the insertion of the muscle, and, incising this with scissors, enter the points of the latter at the opening between the conjunctiva and the capsule of Tenon. I then carefully separate these two tissues from each other as far as the semilunar fold, also separating the latter, as well as the caruncle, from the parts lying behind. When this portion of the capsule, which is of much importance in the tenotomy, has been completely separated from the conjunctiva, I divide the insertion of the tendon from the sclerotic in the usual manner, and extend the vertical cut, which is made simultaneously with the tenotomy, upwards and downwards—the more so if a considerable effect is desired. The wound in the conjunctiva is then closed with a suture. The following are the advantages of my proceeding:

“*First.*—It affords the operator a greater scope in apportioning and dividing the effect of the operation between the two eyes.

“*Second.*—The sinking back of the caruncle is avoided, as well as every trace of a cicatrix, which not uncommonly occurs in the common tenotomy.

“*Third.*—There is no need for more than two operations on the same individual, and therefore of more than one on the same eye.”

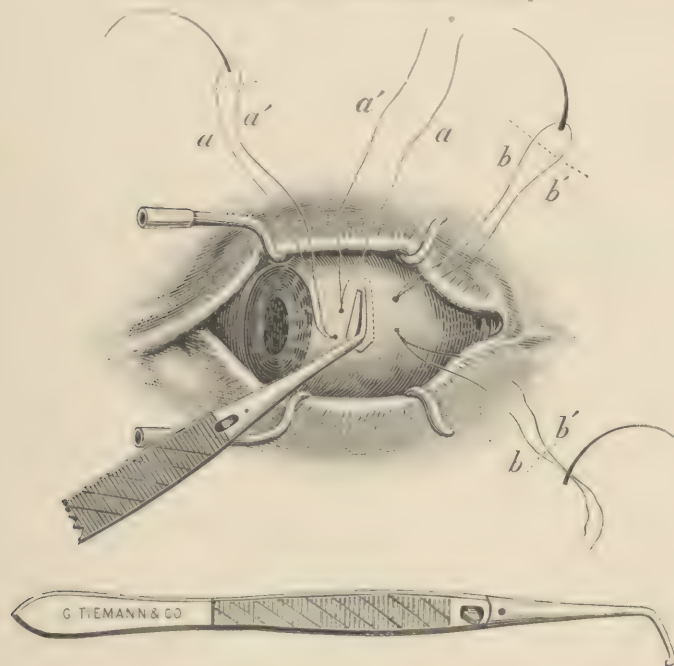
Noyes, of Detroit, operates by making the tenotomy on the elongated tendon. The shortening necessary to correct the squint is made by lapping the ends of the divided tendon, and maintaining them in position by two sutures passed through the conjunctiva and lapped ends of the tendon, above and below, and tied lightly.—“Transactions Am. Ophth. Soc.” “Soelberg Wells’ Diseases of the Eye,” p. 714. Am. Ed., 1883.

OPHTHALMIC.

The Advancement of the Rectus and Limiting Strabismus Operation

of Dr. A. E. Prince, of Jacksonville, Ill., improved since publication in the *St. Louis Medical and Surgical Journal*, 1881, and first edition of "Diseases of the Eye," by H. D. Noyes, will be elucidated by the following brief description:

FIG. 1882.—Prince's Advancement Forceps.



crossed over suture, *a*, both branches of which are now tied down enclosing, *b*, in a loop or pulley.

6th. Both branches of *b*, are now taken up and tied, when it will become apparent that, in proportion as they are tightened over the loop (formed by *a*), will the free end of the rectus be approximated to the insertion of the tendon simultaneously closing the conjunctival gap. A *bow knot* is now applied, by loosening which the effect may be *modified*, and, after several hours, if satisfactory, sutures *a'* and *b'* (which are reserve sutures to be used in case of entanglement) are withdrawn. The eye is washed out and kept moistened with absorbent cotton compresses, frequently soaked in one-half per cent. aqueous solution of acid. carbol. purum, with ten per cent. of glycerine.

For considerable effect and to diminish the tension on the loop suture the tendon of the opposite rectus is divided as a preliminary step, and, in case of *paralysis*, as much as possible of the anterior portion of the opposite rectus should be *excised or divided*, back of the capsule.

Limiting Strabismus Suture.

As a *limiting suture* this method is employed by the author to afford security against over correction following ordinary section of the rectus: first, in those cases where one desires to produce an *extreme* effect by extensive division of the capsule, and, second, in the correction of *minimum* degrees of deviation which compromise comfortable binocular vision. In these cases *a* and *b* are introduced single and further forward, previous to section of the tendon, simply dipping into and out of the muscle with a single sharply-curved needle (*care being exercised* to exert no traction on the hook, thus avoiding temporary paresis and diminishing the consequent dangers of subsequent deviations). Both conjunctiva and capsule are now divided together with the tendon, after which the effect is limited by the completion of stitch as in the advancement operation. For further details apply to author for reprint of publication.

FIG. 1883.—Prince's Needle for Advancement and Canthoplasty.



* *Cocaine*, as a local anæsthetic, was first used by Dr. Koller, of Vienna, on the eye; he also suggested its use on the throat. In America surgeons apply cocaine successfully in many other operations. (See reports in *New York Medical Record*, of Nov. 22, Dec. 13 and 27, 1884, and other medical literature of this period.)

OPHTHALMIC.

SURGICAL ANATOMY OF THE GLOBE OF THE EYE.

A concise description of those parts of the globe of the eye which are important in reference to the operations performed on this organ and the instruments employed. (For Pterygium, Pannus, Hypopyon, Phlegmon, Hydrophthalmia, Artificial Pupil, Cataract, Spots on the Cornea, Extirpation of the Eye, Insertion of an Artificial Eye.)

Proceeding from the periphery toward the centre of the eye, we meet with :

The conjunctiva, a delicate and vascular membrane, which, after lining the inner aspect of the eyelids, is reflected over the globe of the eye, and covers all the visible portion of the sclerotica and cornea. At the internal angle of the eye it forms a *cul-de-sac* of some depth before it is reflected upon the sclerotica. The conjunctiva is tough and resisting, and the instruments which are used for cutting it should be of very superior quality.

The transparent cornea is intimately united to the sclerotica. It is composed of laminae laid one upon the other, between which the points of instruments may become engaged when they are not plunged at once through the cornea.

The sclerotica extends from the optic nerve to the cornea. This envelope is of a pearly white color ; it is elastic and dense, so much so that in penetrating it the point of the instrument should be introduced with a sudden and vigorous thrust, and at right angles with the membrane. The muscles of the eye are inserted into the sclerotica.

The choroid lines the internal aspect of sclerotica, to which it slightly adheres. This membrane is composed of two distinct laminae ; one, internal, consists entirely of the coloring matter ; the other, external, is essentially vascular. The ciliary vessels and nerves ramify between the choroid and sclerotica.

The long ciliary arteries which supply the iris are two in number—one internal and the other external. They are found between the choroid and sclerotica, in the plane of the transverse diameter of the globe, and take their course horizontally from behind forwards. To avoid injuring them the sclerotica should be punctured below or above the transverse diameter of the eye. Between the choroid, sclerotica, and iris, and directly opposite to the circumference of the cornea is situated the *ciliary circle or ligament*, presenting the appearance of a greyish colored ring. It is essentially vascular and interwoven with nervous filaments anastomosing with each other. In performing operations upon the eye, it should be carefully avoided.

The ciliary processes, folds formed by the internal lamina of the choroid, float behind the iris and surround the circumference of the crystalline lens, without possessing any intimate adhesions with it.

The iris, a diaphragm situated between the transparent cornea and the crystalline lens, separates this anterior portion of the globe of the eye into *two chambers* : one, the *anterior*, between the cornea and the iris ; the other, the *posterior*, between the iris and the crystalline lens. The distance between the cornea and the iris is, at the centre, between a line and a line and a half. The distance between the iris and the lens is half a line, and not unfrequently they are in contact, which renders the passage of instruments between these two organs very dangerous for both.

The two chambers communicate with each other by the *pupil*, a circular opening in the centre of the iris. The greater circumference of the iris is in connection with the ciliary ligament, from which it can be easily separated. This anatomical arrangement is made use of in the operation for artificial pupil.

The iris floats freely in the middle of the eye as soon as instruments by their presence have destroyed the equilibrium of the pressure of the fluid by which it is maintained in its place. It is very necessary to avoid injuring this membrane, and to penetrate the anterior chamber very cautiously when operating for cataract by extraction.

The movements of the pupil have been variously explained by means of theoretical ideas concerning the structure of the iris. We refer to those theories which have originated particular methods for the operation of artificial pupil. The action of light and belladonna upon the iris is well known.

The crystalline lens, situated behind the iris, is a double convex lens, formed by concentric layers of unequal density, but which increase in solidity as we approach its centre. The most external layer is almost liquid and has received the name of *liquor Morgagni*. The most concentric layer, or the *nucleus*, is of a gummy consistence, and easily crushed with the finger. On pressure the lens easily separates into triangular segments, with their apices towards its centre. Each of these segments may be opaque of itself, or as a whole they may present different degrees of opacity, which gives to certain varieties of cataract their stellated or marbled appearance. The facility with which the crystalline lens is divided increases the difficulties in the operation by depression.

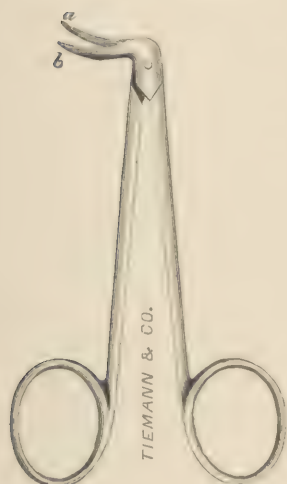
The crystalline lens is enveloped by a membrane or capsule, which, by its connections with the hyaloid membrane, and its contact with the ciliary processes, maintains the lens in its place. These relations often render the depression in mass of the crystalline apparatus very difficult in cases of general cataract. In milky or lenticular cataract it suffices to lacerate the capsule and permit its contents to escape.

Behind the crystalline lens is placed the *vitreous humor*, a gelatinous mass which fills the four posterior fifths of the globe of the eye. A very delicate membrane, the *hyaloid*, envelopes the vitreous humor, and by its numerous processes divides it into isolated cells of variable forms. To facilitate the operation for cataract by depression, it is frequently necessary to rupture with the needle some of these hyaloid cells.—“Bernhard and Huette's Manual of Operative Surgery.” Van Buren and Isaac's Am. ed., 1857, p. 146.

OPHTHALMIC.

PTERYGIUM AND PANNUS.

FIG. 1884.—Chadwick's Pterygium Scissors.



Pterygium is a species of fleshy excrescence which attacks the cornea, and is usually triangular in form ; its position is commonly towards the inner angle of the eye.

Pannus, less regular in its form, may attack any portion of the cornea. The same modes of operating are applicable to both.

The small excrescence is seized with a double hook (Fig. 1873) or a pair of mouse-toothed forceps, and excised with a small scalpel or a pair of scissors curved upon their flat surface ; it should then be cauterized with nitrate of silver. These diseases frequently return and are apt to leave an opacity of the cornea after them.—“Bernhard and Huette's Operative Surgery.” Van Buren and Isaac's Am. Ed. 1857.

FIG. 1885.—Knapp's Caustic Holder.



See CHILD'S BRUSH AND CAUSTIC HOLDER, Fig. 1303, p. 77.

FIG. 1886.
Prince's Pterygium Divulsion Hook.



To explain Fig. 1886, reference is made to the publication of Dr. A. E. Prince, of Jacksonville, Ill., in the “Archives of Ophthalmology,” March, 1885, where a case is reported which originated a new and valuable procedure, particularly adapted to the separating of the pterygium from the underlying cornea, with the preservation of its transparency. By accident, while lifting the growth with a strabismus hook, in place of the forceps, in a case of extensive pterygium covering the pupil, an unskillful movement of the assistant tore the pterygium from the cornea. “Inspection converted solicitude into satisfaction, for the removal had been accomplished with the least possible injury to the parts, leaving at the same time so transparent a surface that the iris and pupil were distinctly seen.” The uneventful recovery of this case, without opacity of the cornea, led Dr. Prince to em-

ploy no other method in the separation of the corneal portion of the growth, and after two years of favorable experience, he has considered it worthy of publication.

To facilitate the operation we have made, at his suggestion, the *enucleation or divulsion hook*, with a cutting point to favor its introduction under the growth at the corneal margin, and wedge-shaped, so that the separation from Bowman's membrane may be more easily accomplished than with the ordinary strabismus hook. Experience has shown that the inevitable remnants of opaque material, which follow the usual dissection with scissors, and the facets and opacities from wounds of the cornea, which too often occur from the use of the knife, are largely avoided when the usually feeble union between the cornea and pterygium is severed by the sliding motion of the hook, counter-traction being exercised with forceps.

PARACENTESIS CORNEÆ.

Hypopyon, Phlegmon, Hydrophthalmia.

Purulent accumulations in the anterior chamber (hypopyon) are easily absorbed in the great majority of cases, so that puncture is rarely necessary ; but, when required, it may be performed by introducing an ordinary broad cataract needle into the most dependent part of the transparent cornea.

In cases of acute phlegmon of the eye, when the pain caused by the purulent accumulation has become intolerable, an exit must be given to the fluid. This may be done by opening the cornea at its most inferior portion by a simple incision with a cataract knife.

Hydrophthalmia, when it greatly distends the globe, or when it is accompanied by intense inflammatory action, also requires paracentesis. According to the case, the liquid may be entirely or only partially evacuated by a puncture made either in the cornea or sclerotica.

Desmarres, for puncturing the sclerotica, uses a lancet-shaped needle, having two shoulders a short distance from its point, to prevent it from penetrating too far.

See PARACENTESIS NEEDLES AND KERATOMES, FOR INCISION AND SECTION OF THE CORNEA, on p. 162.

OPHTHALMIC.

ARTIFICIAL PUPIL.

The operation for artificial pupil is performed to open a new path for rays of light to the retina, the natural passages being obstructed (Bryant). It was performed for the first time by Cheselden, A. D. 1728, and has since that period undergone an infinite number of modifications.

Four principal methods include all the modes of operating :

- 1st. The incision of the iris, *Iridotomy.*
- 2d. Excision of the iris, *Iridectomy.*
- 3d. Detachment of the iris, *Iridodialysis* or *Coredialysis.*
- 4th. Displacement of the natural pupil, *Corectopy.*

1st Method. Incision of the Iris—Iridotomy, Iridotomia or Corectomia.

Cheselden's Method.—Cheselden introduced a small sickle-shaped needle through the sclerotica, as in the operation for cataract by depression; the needle being freely entered into the posterior chamber. He turned the point towards the iris, and with a slight sawing motion made a horizontal incision of this membrane from behind forwards from a line and a half to two lines and a half in length.

Sharp introduced the needle through the cornea.

Reichenbach, Odhelius and *Richter* incised the cornea and divided the iris from before backwards.

Jurine introduced a needle through the sclerotica, and perforated the iris from behind forwards, and again from before backwards. These two punctures are then united by a single incision made by disengaging the needle downwards and backwards.

Janin, having noticed that the horizontal incision of the fibres of the iris was almost constantly followed by reunion of the lips of the wound, determined to divide them across; to effect this, he introduced a small knife, or a pair of delicate scissors, through the cornea, and made his incision vertical, and on the inner side of the natural pupil.

Guerin's Method.—To unite the advantages of the methods of Cheselden and Janin, Guerin first opened the cornea, and then made a crucial incision of the iris, which divides its radiating fibres vertically as well as transversely.

Maunoir also incises the cornea, and then, with delicate bent scissors, cuts a triangular flap from the iris, whose apex is at the centre and base at the circumference of that membrane.

Carron du Villars operates in the same way as Maunoir, but uses scissors without rings, and which are kept open by a spring.

Velpeau used an elongated double-edged knife, resembling very much the serpent-tongued lancet. The instrument transfixes the cornea; the point passes first through the iris from before backwards and penetrates the posterior chamber; it is then brought from behind forward through the iris in the anterior chamber, about a line and a half or two lines from the first incision. The point is now carried anew through the cornea, and thus with a single thrust a flap is cut from the iris and the cornea. The small flap in the iris contracts upon itself, and soon disappears, leaving a triangular-shaped artificial pupil. * * *

2d Method. Excision of the Iris—Iridectomy, Iridectomia.

Wenzel's Method.—This operation is the same as that of Velpeau, described above, with the exception that Wenzel removed the little flap of the iris with scissors, while Velpeau leaves it to itself.

Sabatier opens the cornea as in the operation for cataract, turns up the corneal flap, draws the iris outwards with forceps, and excises it with scissors curved upon their flat surface.

Mulder, after making a crucial incision of the iris, removed one by one the small triangular flaps resulting from the incision.

Physick used a pair of cutting forceps; one of the jaws is introduced behind, the other in front of the iris. These jaws being brought together remove a circular portion of the iris. *Furnari* uses an instrument similar to that of Physick.

Leroy d'Etioles operates upon the iris in situ, with an instrument similar in shape to a tonsil cutter. A small turning hook catches the iris and draws it between two rings, which, sliding one upon the other, excise the portion caught by the hook.

Beer makes a small incision in the cornea, through which he introduces a small hook which catches the iris and draws it through the wound in the cornea; with delicate scissors he excises the portion of the iris.

Desmarres incises the cornea with eye forceps, seizes a fold of the iris, draws it out through the wound and excises it. * * *

3d Method. Detachment of the Iris—Iridodialysis, Coredialysis.

The facility with which the iris detaches itself from the ciliary ligament was taken advantage of for the first time by *Assalini* and *Buzzi*, in the operation for artificial pupil. *Scarpa* systematized the method, and introduced it into practice.

OPHTHALMIC.

ARTIFICIAL PUPIL.

3d Method. Detachment of the Iris—Iridodialysis, Coredialysis. (Continued.)

Scarpa's Method.—A needle is plunged into the eye through the sclerotica, as in the operation for cataract by depression; the point of the needle is carried to the superior and internal border of the iris, passed through this membrane from behind forwards, and, with a see-saw motion, one-third of its circumference is detached by depressing it from within outwards.

Leveillé's method differs from the preceding only in the previous depression of the lens to avoid injuring it during the operation.

The methods of *Himly*, *Flajani* and *Beer* consist in introducing the needle through the cornea, which facilitates the operation and allows the pupil to be made at any point of the iris. *Assalini* makes a large opening in the cornea, and detaches the iris with eye forceps. *Bonzel* detaches the iris with a small hook.

Langenbeck's Method.—Impaction is united with detachment. An opening of a line or two is made in the cornea with an ordinary keratome; through this opening a small hook enclosed in a cylindrical sheath is introduced; the hook, slipped from its sheath, catches the iris and draws the detached flap into the wound in the cornea, where it contracts adhesions which prevent it from closing up the newly formed pupil.

Luzardi's Method.—Luzardi invented a hooked needle consisting of two branches sliding one upon the other, but held together by a spiral spring. The needle is easily introduced into the eye, either through the cornea or the sclerotica, without any previous incision; when it is fully entered, one of the branches is slid backwards, which exposes a small hook with which a flap of the iris is seized; the spring, left to itself, forces the movable branch against the hook, which thus grasping the detached flap, easily serves to draw it out through the wound.

Donegana's Method.—Donegana unites incision with detachment. A sickle-shaped needle, having a cutting edge on its concave aspect, is introduced through the cornea or sclerotica; the iris is detached with the convex border of the instrument, while with the concave cutting edge it is divided from its circumference towards its centre.

Huguir, remarking that, when the iris is detached from the ciliary ligament, it folds before the instrument and is incised with difficulty, begins by dividing it from the centre to the circumference, and afterwards detaching each lip of the wound.

4th Method. Displacement of the Natural Pupil—Corectopy, Corectopia.

This displacement is applicable in cases where the natural pupil is marked by a spot upon the centre of the cornea. The object of the operation is to place the pupil behind a portion of the cornea which is not opaque.

Adams' Method.—Adams made a small incision in the cornea, into which he drew the iris, to change the position of the natural pupil. When cicatrising, the wound of the cornea created adhesions, which retained the iris and the pupil in their new position.

Himly, like Adams, makes an incision through the cornea, and draws the iris outwards with a small hook caught in the circumference of the natural pupil.

Guepin and *Desmarres* invented a punch-like knife with which a small portion of the cornea is removed, and into which opening the iris falls; when the iris does not fall into this opening of its own accord, it is easily forced into it by making a slight pressure upon the eyeball. The cicatrization of the cornea creates an impaction of the iris. * * * (“Bernhard’s and Huette’s Manual of Operative Surgery,” Van Buren and Isaacs’ Am. Ed. 1857. p. 158.)

IRIDECTOMY.

As a preliminary step in the operations for the extraction of Cataracts.

Wecker's Method.—An incision of eight millimetres is made with a Von Graefe’s knife through the cornea and iris, about two millimetres from the lower margin of the cornea. The forcep scissors are then introduced, one blade passing behind the iris and exudation masses, the other along the posterior surface of the cornea, with two incisions which meet at the apex, a triangular portion of the iris is excised. The forcep scissors are bent at an angle, and can be passed through a small corneal opening, and yet be widely opened in the anterior chamber (Fig. 1928).

Bowman's Method: Excision of the Pupil.—The puncture and counterpuncture are made with Graefe’s Linear Knife, the blades of a pair of fine scissors—one point blunt, the other sharp—are then introduced through the first incision; the blunt point is passed in front of the iris, the sharp point pierces the iris and anterior capsule of the lens, and running down in front of the nucleus a cut is made diagonally downwards as far as the centre of the lower part of the iris. The scissors are then withdrawn and next introduced through the counterpuncture and a similar incision made on this side so that the two incisions meet at the lower part of the iris, including between them a triangular piece of the iris as well as the constrictor pupillæ. Finally, the base of the triangle is divided by cutting through the upper portion of the iris lying between the puncture and counterpuncture, and the whole triangular piece is then removed, as well as any false membrane attached to it, with a pair of forceps.—“Soelberg Wells on the Diseases of the Eyeball.” Am. Ed. 1883. p. 326.

OPHTHALMIC.

KERATOMY. (CERATOTOMIA.)

For Paracentesis Corneæ, to give exit to Pus in case of Hypopyon, and for Section of the Cornea in certain methods of operating for the formation of Artificial Pupil and the Extraction of Cataracts.

FIG. 1887.—Jaeger's Angular Keratome,
or Artificial Pupil Knife.

FIG. 1902.—Baader's Linear Knife,
curved to the right.

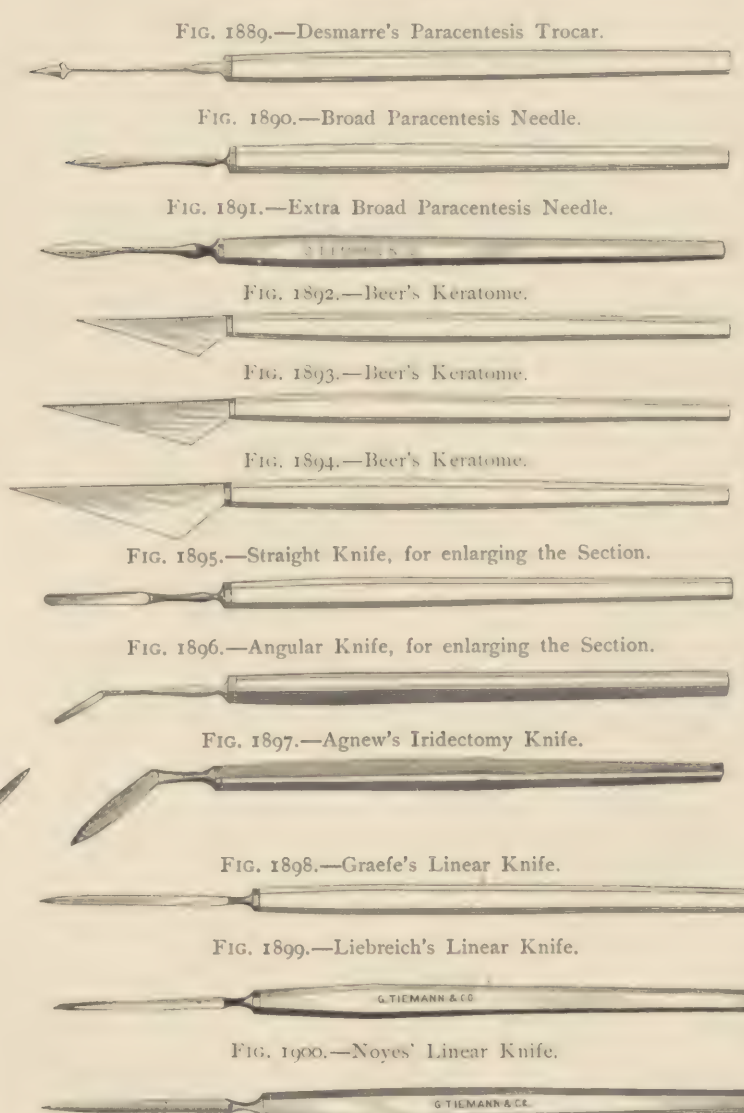


FIG. 1901.—Test Drum, to try the edges of Eye Instruments.



FIG. 1888.—Jaeger's Straight Keratome,
or Artificial Pupil Knife.

FIG. 1903.—Baader's Linear Knife,
curved to the left.

OPHTHALMIC.

IRIDOTOMY, IRIDECTOMY, IRIDODIALYSIS, CORECTOPY.

For operating on the Iris for the formation of Artificial Pupil, per se, and as a preliminary step in the Extraction of Cataract.

FIG. 1904.—Sichel's Iris Knife.



FIG. 1920.—Adams' Iris Knife.



FIG. 1907.—Beer's Straight Needle.

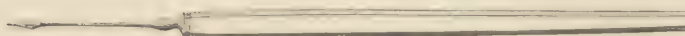


FIG. 1908.—Narrow Straight Needle.

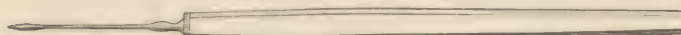


FIG. 1909.—Scarpa's Curved Needle.

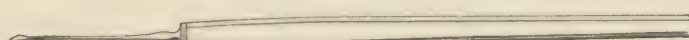


FIG. 1910.—Crichton's Hooked Needle.

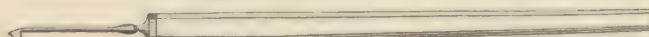


FIG. 1911.—Luzardi's Hooked Needle.

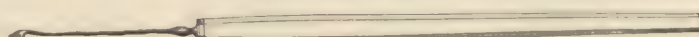


FIG. 1912.—Levi's Needle, with an Eye.

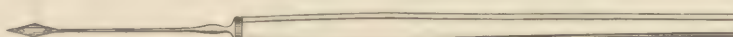


FIG. 1913.—Iris Knife.

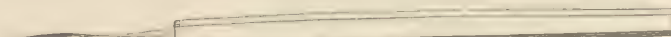


FIG. 1914.—Double-Edged Iris Knife.

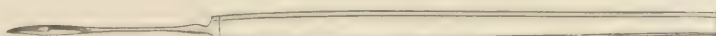


FIG. 1915.—Iris Knife, with a Stop.

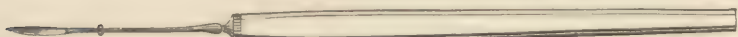


FIG. 1916.—Knife Needle.

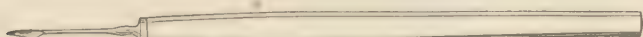


FIG. 1917.—Wilde's Canulated Needle.



FIG. 1918.—Wilde's Canulated Forceps, Scissors and Forceps Needle, in one Handle.

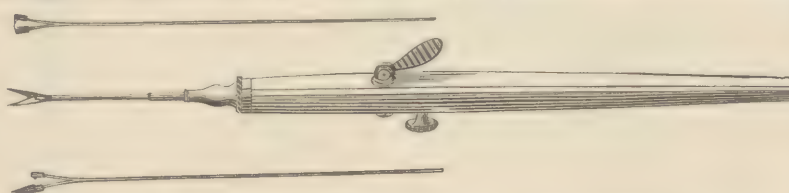


Fig. 1919.—Wilde's Canulated Forceps (Lithotripter-like).

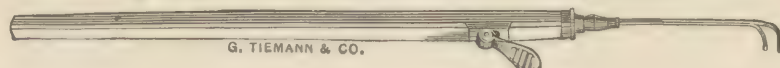


FIG. 1905.—Hayes' Knife Needle.

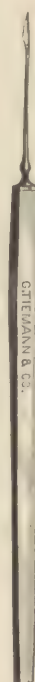


FIG. 1906.—Sickle-shaped Iris Knife.



FIG. 1921.—Tyrrell's Blunt Hook.



FIG. 1922.—Tyrrell's Sharp Hook.



OPHTHALMIC.

IRIDOTOMY, IRIDECTOMY, IRIDODIALYSIS, CORECTOPY.

For operating on the Iris for the formation of Artificial Pupil, per se, and as a preliminary step in the Extraction of Cataract.

FIG. 1923.—Curved Iris Scissors.

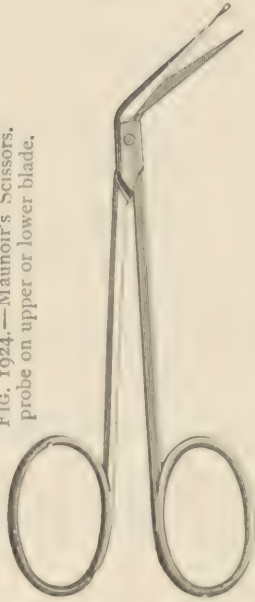
FIG. 1924.—Maunoir's Scissors.
probe on upper or lower blade.

FIG. 1925.—Althof's Iridectomy Scissors.

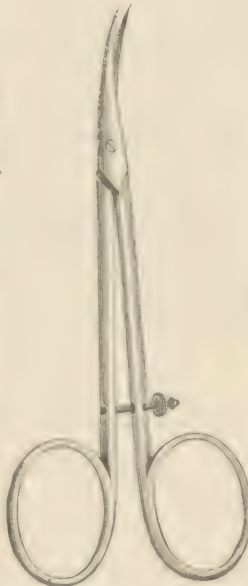


FIG. 1926.—Straight Iris Scissors.



FIG. 1927.—Noyes' Iris Scissors.



FIG. 1928.—Wecker's Iridotomy Scissors.



FIG. 1929.—Strawbridge's Keratome Scissors.



FIG. 1930.—Culbertson's Incystome.



FIG. 1931.—Welker's Iridectomy Instrument.

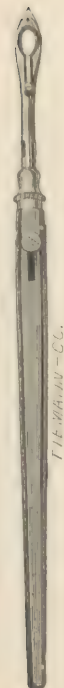


FIG. 1932.—Hall's Iris Scissors.



The object of this instrument is to cut a triangular portion of the iris and lens capsule, or of either, and thus form an artificial pupil in a certain class of eye cases. The front blade is solid, the back blade a little larger and fenestrated, so as to cut out an equilateral triangle of the included membrane. But it does not cut the base of the triangle. Hence an incision is needed of the iris or capsule, or both, before using the instrument.—See *Journal of Ophthalmology*. Oct. 15, 1884.

FIG. 1933.—Lanne's Forceps Needle, for False Membranes.



FIG. 1934.—Culbertson's Iris Hook.



OPHTHALMIC.

IRODOTOMY, IRIDECTOMY, IRIDODIALYSIS, CORECTOPY.

For operating on the Iris for the formation of Artificial Pupil, per se, and as a preliminary step in the Extraction of Cataract.



FIG. 1937.—De la Rosa's Iris Needle, for Detachment.



See SUTURE NEEDLES, page 146.

FIG. 1938.—Liebreich's Iris Forceps (latest).

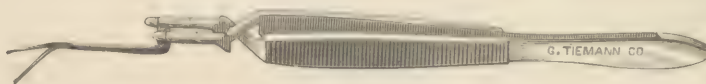
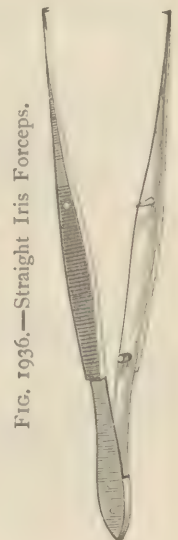


FIG. 1939.—Walton's Self-Holding Iris Forceps.



FIG. 1940.—Fischer's Iris Forceps.



CATARACT.

Cataract is a partial or total opacity of the crystalline apparatus. The opacity may affect: 1st. The crystalline membrane, causing *capsular* or *membranous cataract*; 2d. The liquor Morgagni, giving rise to *milky cataract*; 3d. The crystalline lens, *lenticular cataract*; 4th. The lens and its capsule, *capsulo-lenticular cataract*.—Cataracts may be either hard, soft or liquid. Lenticular cataracts are usually hard and dark; they are common in old persons. Capsular cataracts are softer and clearer than the former. Milky cataracts are liquid and less opaque in the superior than in the inferior half of the capsule, their opaque particles obeying the laws of gravity."—Bernhard and Huette's "Manual of Operative Surgery." p. 149. Van Buren and Isaacs' Am. Ed. 1857.

The Operations for Cataract.

"The different operations for this purpose have for their common object the removal of the opaque body from behind the pupil, so that the rays of light may be again allowed to pass on to the retina. This object is sought to be effected in one or other of three different ways, according to the circumstances of the case, viz.:

- 1st. By at once extracting the cataract from the eye.
- 2d. By simply displacing it to below the level of the pupil.
- 3d. By lacerating the capsule and dividing the lens, in order that the latter, being exposed to the action of the aqueous humor, may be gradually dissolved and absorbed, and thus eventually removed from the eye. Of these three different ways again, there are different modifications."—Jones' "Ophthalmic Medicine and Surgery." p. 221. Am. Ed. 1863.

Extraction of Cataract.

Extraction of cataract may be effected by the *flap* or *linear* methods, which consist in opening, with suitable instruments, the transparent cornea and the anterior portion of the capsule of the crystalline, and causing the lens to issue through the aperture. Soft cataracts may also be removed by the *suction operation*.

Operative Indications.

The general conditions of success are the following: Satisfactory general health; healthy condition of the eye; absence of even slight inflammation of any of its tissues; cornea unblemished; movable pupil; non-adherent iris; sensible retina; maturity of the cataract, proved by the entire loss of sight; existence of cataracts on both eyes, in order that the second eye may not be endangered by the unforeseen and frequently unfavorable consequences of the operation when performed upon the diseased eye; operate upon children in infancy; a moderate atmospheric temperature; excessive heat or extreme cold are frequently prejudicial.—Bernhard and Huette's "Manual of Operative Surgery." Van Buren and Isaacs' Am. Ed., p. 149. 1857.

OPHTHALMIC.

EXTRACTION OF CATARACT.

FIG. 1941.—Superior Flap—Beer's Keratome.

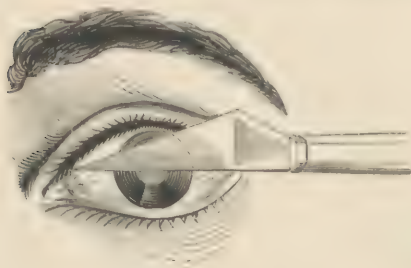
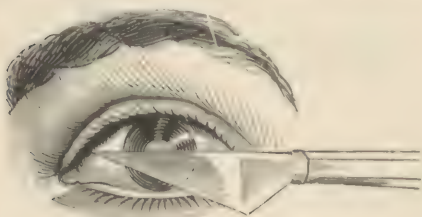


FIG. 1942.—Inferior Flap—Beer's Keratome.

**Corneal or Flap Operation.**

The cornea may be cut on its inferior or superior half, or obliquely on its external and lower portion, each of which methods has its special advocates.

The corneal or flap operation is performed in three periods or steps:

- 1st Step. *Incision of the Cornea* (with Beers' or similarly shaped knives).
- 2d Step. *Division of the Capsule* (with needle or cystotome).
- 3d Step. *Expulsion of the Cataract* (with Daviel's or other spoons).

Mackenzie gives the following description of the operation:

1st Step.—The point of the knife is entered on the temporal side of the cornea, at the distance of one-twentieth of an inch from the sclerotic, the blade being kept strictly in a plane with that of the iris. The point, in first puncturing the cornea, must do this perpendicularly to that structure; otherwise it might pass between its lamellæ, instead of entering the anterior chamber. The point of the knife is directed towards the point of exit at the cornea, opposite to, and corresponding with, the point of puncturation. The knife is simply pushed slowly and cautiously onwards, so as to cut its way out by its purely progressive motion, no sawing or dragging of the edge against the cornea being permissible. Many operators leave the last small portion of the cornea undivided by Beer's knife before proceeding to the next step of the operation.

2d Step.—This consists in lacerating the capsule of the lens sufficiently with the cystotome to permit of the exit of the cataract. If a small bridge of cornea has been left undivided, this may then be severed by a blunt-pointed knife or scissors. The upper eyelid may now be allowed to drop.

3d Step.—After a minute's pause, the eye is again opened, when a little gentle pressure and manipulation on it with the finger, or the back of the curette, will usually suffice to determine the exit of the lens through the corneal wound.—"Ophthalmic Surgery," Laurence and Moon. Am. Ed. 1866. 111 pp.

Linear Extraction.

This operation, devised by Gibson in 1811, modified soon after by Travers, and lately revived in Germany, consists in making a small incision through the outer and lower part of the cornea from the eighth to the sixth of an inch in extent, in freely dividing the capsule and lens with a fine cutting needle, and in removing the fragments, after they have been brought into the anterior chamber, with a scoop. If thorough comminution has been effected, most of the fragments will probably be washed away by the aqueous humor, as it gushes through the wound; if not, they should be carefully extracted, unless they are very small, when they may be left in the hope of being speedily absorbed. Linear extraction is, of course, applicable only to soft cataracts.—"System of Surgery," Gross. Vol. II., p. 194. 1882.

The Modified Linear or Spoon Operations.

* * * In those cases in which there was a somewhat firm nucleus, *Von Graefe* was led to modify the linear extraction, and to *excise a portion of the iris* prior to the laceration of the capsule, and then to remove the lens with a broad flat scoop. The stages of this operation were as follows: 1st. *The incision* was made at the edge of the cornea (temporal side) and embraced about a quarter of its circumference. 2d. *A portion of iris* was removed, the size of which did not, however, quite equal the extent of the incision. 3d. *The capsule* was freely divided quite up to the margin of the lens. 4th. *A scoop* was then introduced at the free edge of the lens and gently inserted between the posterior cortical substance and the nucleus, and the cataract lifted into the anterior chamber and extracted. The scoop which he employed for that purpose was shallower, broader, and sharper at the extremity than Daviel's Curette. Thus originated the "modified linear" or "scoop" extraction—an operation which afterwards assumed so important a position in ophthalmic surgery. By this operation *Von Graefe* greatly extended the applicability of the linear extraction, for he was now able to remove through a linear incision cataracts whose cortex was of a pulpy consistence, and the nucleus moderately large and hard—a form of cataract which would otherwise have necessitated the flap extraction. To *Von Graefe* belongs the credit of having first suggested, in some cases, the combination of an iridectomy with flap extraction, and also of having introduced the modified linear or scoop extraction.—"Soelberg Wells on Diseases of the Eye." Bull's Am. Ed., p. 456. 1883.

OPHTHALMIC.

EXTRACTION OF CATARACT.

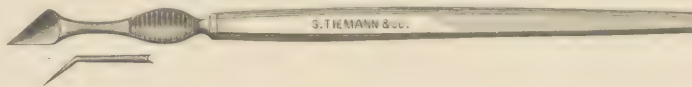
The Modified Linear or Spoon Operations. (Continued.)

In 1860 *Waldau* proposed the following operation for cataract: An incision with a lance-headed keratome is made into the cornea, half a line from its junction with the sclerotic, and embracing one-fourth of its circumference; a portion of iris is excised; the capsule of the lens lacerated freely with a cystotome; a silver spoon inserted into the corneal incision, and glided along the posterior surface of the lens, between this and its capsule; the lens, when fairly received into the bowl of the spoon, is then removed from the eye, as the spoon is withdrawn by the operator. * *

Critchett did away with the high rising edges of *Waldau's* spoon, and replaced its terminal one by an inverted edge (Fig. 1957), so fashioned as to glide easily along the posterior surface of the lens, but to seize the distal margin of the lens firmly in its grasp as soon as the operator attempts to withdraw the spoon from the eye. * * * A second improvement was to enlarge the corneal incision from one-fourth to one-third of the cornea. * * * In *Waldau's* original operation the lens is spooned or scooped out; in the modified one, it is drawn out. Hence this latter operation has been appropriately termed "traction-operation."—"Ophthalmic Surgery." Laurence and Moon. Am. Ed. 1866. p. 114.)

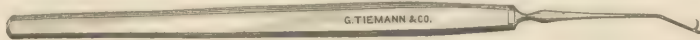
* * * *Adolph Weber's* mode of extracting hard cataracts through a linear incision made with a lance-shaped knife, without any excision of the iris or the employment of a traction instrument. He employs a large lance-shaped knife, which is ten and twenty-five one-hundredth millimetres in length, and ten millimetres broad at a distance of six and five-tenths millimetres from its point; and this width it retains for a distance of two millimetres, in order that the internal and external wound may be exactly the same size; thence it becomes narrower to pass over into the stem.

FIG. 1943.—Weber's Keratome.



The back of the blade is not flat, but hollowed out. The blade is bent at an angle of about 120° , in order that it may be readily used from above or the nasal side. The pupil is kept dilated with atropine for a day or two before the operation. The eyeball fixed below the centre of the lower margin of the cornea with broad fixation forceps, and gently drawn down, the point of the knife is to be entered in the centre of the upper margin of the cornea, just in the sclero-corneal junction. If the diameter of the cornea is less than twelve millimetres, the incision is to lie a little further away from the edge of the cornea. The blade is to be carried slowly and steadily forward across the anterior chamber as far as the base of the instrument; its point will then have nearly reached the opposite (lower) margin of the cornea. The knife is then to be *very slowly* withdrawn. This will prevent the sudden escape of the aqueous humor, which, from its stimulating the constrictor pupillæ, would cause the pupil to contract. Moreover, during the slow and gradual withdrawal of the knife we can press the back of the blade somewhat against the edge of the section, and thus prevent prolapse of the iris. The capsule is then to be very freely lacerated, for which purpose *Weber* used a very minute double hook

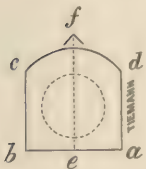
FIG. 1944.—Weber's Double Hook.



(Fig. 1944), the stem being bent at an angle, so as to permit of its being readily turned. The capsule is to be divided in the following way, the lines of incision lying somewhat below the iris, as shown in Fig. 1945, where the dotted line indicates the pupil. The hook having been passed down to *a*, the capsule is to be divided from *a* to *b*, and thence to *c*; then the instrument is to be again passed to *a*, and the capsule divided from *a* to *d*, and thence to *c*, the last incision lying, of course, along the inner margin of the section. If, on the withdrawal of the hook, the capsule does not present in the section, the instrument is to be reintroduced, passed down to *c*, and the square torn portion of capsule drawn out in the direction of *f*; or it may be extracted with a small pair of iridectomy forceps. The anterior thin lip of a peculiarly constructed curette is then to be placed on the external lip of the wound, so as to press this back a little, and thus facilitate the presentation of the equator of the lens in the incision, the exit of the cataract being assisted by a slight simultaneous

pressure of the fixation forceps below the cornea. During the exit of the lens, the iris generally protrudes a little into the wound, and if it does not retract at once when the cataract has escaped, it should be replaced by applying *Von Graefe's* vulcanite curette, and gently moving this from the angles towards the centre of the section. This will soon cause the iris to retract and the pupil to resume its normal position, a point which should be always carefully attended to before the operation is considered as finished.—"Soelberg Wells on Diseases of the Eye." Bull's Am. Ed., p. 457. 1883.

FIG. 1945.



OPHTHALMIC.

CYSTOTOMY, CAPSULOTOMY.

For the Laceration or Division of the Capsule in Operating for the Extraction of Cataracts.

FIG. 1946.—Knapp's Cystotome.



FIG. 1947.—Cystotome, for Lacerating the Capsule.



FIG. 1948.—Graefe's Cystotome.

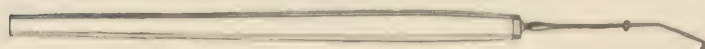
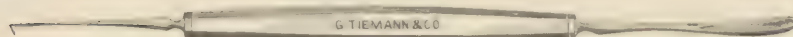


FIG. 1949.—Cystotome and Daviel's Spoon.



For Removal, Expulsion or Withdrawal of the Cataractous Lens. Final step in the Operation for the Extraction of Cataracts.

FIG. 1950.—Graefe's Lens Tractor.



FIG. 1951.—Tortoise Shell Lens Spoon.



FIG. 1952.—Hard Rubber Lens Spoon.



FIG. 1953.—Bowman's Flat Lens Spoon.



FIG. 1954.—Noyes' Lens Spoon.

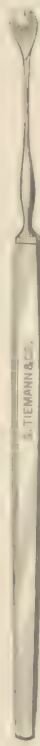


FIG. 1955.—Bowman's Concave Lens Spoon.

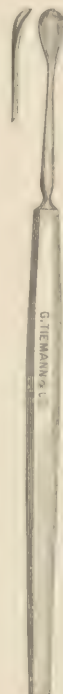


FIG. 1956.—Crichton's Flat Lens Spoon.

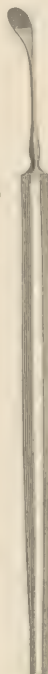


FIG. 1957.—Crichton's Concave Lens Spoon.

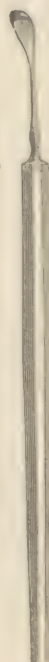


FIG. 1958.—Silver Lens Spoon and Cystotome.



FIG. 1959.—Levi's Fenestrated Lens Spoon.



FIG. 1960.—Lens and Foreign Body Forceps.



OPHTHALMIC.

EXTRACTION OF CATARACT.

Graefe's Peripheric Linear Extraction.

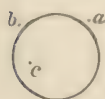
* * * An operation which combines all the merits of the *flap extraction* and the *linear method with traction*, together with superior advantages of its own, devised by Von Graefe, and termed by him the "*peripheric linear extraction*" method.

His extended clinical experience enabled him to render each step of his operation so perfect that it is accepted by ophthalmic surgeons universally as the best now known. It is most readily described by dividing it into four stages: 1st. *Incision*; 2d. *Iridectomy*; 3d. *Laceration of the Capsule*; 4th. *Removal of the lens*. The instruments required are the stop speculum, fixation forceps, iris forceps, and scissors, described under the head of iridectomy; added to which are the capsule tearer, or cystotome, a caoutchouc spoon, and a narrow knife.

As the pain of the operation is not severe, and as it is very desirable that the patient should give some assistance in moving the ball, if it should be found requisite, an anæsthetic should not be given if it can be avoided.

The patient having been placed in the recumbent position, the surgeon, if limited to the use of his right hand for his incision, must place himself behind the patient for his right eye, and at his left side for the operation on the left eye. Having secured the eyelids by means of the speculum, the surgeon seizes the conjunctiva, beneath the cornea, with the fixation forceps, and thus gains control of the ball; or, what is better, he grasps, as is the practice of Dr. Levis, the inferior straight muscle. Holding the knife with its cutting edge upwards, he then introduces it at a point half a line behind the corneal border and half a line below an ideal tangent to the cornea at its apex, as designated in Fig. 1961.

FIG. 1961.
Graefe's Corneal
Incision.



The point of the knife should be directed towards *c*, until three or four lines of it have entered the anterior chamber, when its point is elevated by depressing the handle; it is then carried to the point *b*, and a counterpuncture made through the sclerótica. The edge of the blade is now turned forwards, and the knife carried onwards until its length is exhausted, when the section is to be finished by drawing it backwards until all the tissues have been divided except the conjunctiva, which should be cut so as to leave a flap of not more than a line or a line and a half in extent.

If these steps have been exactly followed, the anterior chamber will have been opened at its periphery by an incision which shows little tendency to gape, and which will be from four and one-half to five lines in extent, and, although not strictly linear, yet giving a flap of half a line in height.

Confiding the fixation of the ball to an assistant, the surgeon, with the iris forceps, seizes the iris about one line from the temporal extremity of the cut, draws a portion of it out, and, with successive clips of the scissors, divides it at the ciliary attachment, and gradually making the traction towards the nasal end of the incision, finally excises it there as close as possible to the ball.

The fixation forceps being resumed by the operator, the anterior capsule is lacerated with the cystotome, which should be carefully passed to the lower border of the pupil, when its sharp point should be turned against the capsule, which should be incised in a direction upwards and outwards; the point should be again passed to the same spot, and an incision upwards and inwards effected; these two should then be united by a transverse cut across the capsule, when the lens will probably be freed and will be seen to advance.

The surgeon still retains control of the ball, while, with the caoutchouc spoon, applied with its convex surface to the lower border of the cornea, he makes a pressure which has for its object the tilting of the upper margin of the lens towards the corneal incision. When this has been accomplished, a gentle upwards motion of the spoon will cause the cataractous lens to emerge more and more, and finally to escape entirely from the wound. When this manipulation does not succeed, the lens must be withdrawn by one of the traction instruments, one of the best of which is a delicate wire loop devised by Dr. Levis.

If any cortical matter or blood remains, it should be removed by gentle pressure upon the cornea with the spoon, or, after the withdrawal of the speculum and a little delay, by pressure and counterpressure with the finger tips upon the closed lids.—"System of Surgery," Gross. Vol. II., p. 194. 1882.

Liebreich's Method.

Dr. Liebreich found that, without actual formation of a flap, mechanism can be brought about, by means of which the advancing equator of the lens overcomes the obstacles of the iris and of the sphincter papillæ in order to enter the wound. Avoiding iridectomy, he found he could do without elevators and forceps, "and thus change the whole operation into a less violent and almost painless one." He says: In my method the incision is situated entirely within the cornea, with the exception of the points of puncture and counterpuncture, which are placed about one millimetre beyond it in the sclerotic—the whole remaining incision passing with a very slight curve through the cornea, so that the centre of it is about one and one-half or two millimetres within the margin of the cornea. All the instruments required are two, namely, a very small Von Graefe's knife, and a cystotome which has a common Daviel's spoon at the other end.

OPHTHALMIC.

EXTRACTION OF CATARACT.

Liebreich's Method. (Continued.)

1st Step. Supposing the right eye is to be operated upon, the operator, standing behind the patient, takes hold of the upper eyelid with the index finger of his left hand, whilst he slightly presses the middle finger against the inner canthus of the eye. The knife, held in the right hand with its back horizontal and backwards, the plane of the blade making with the horizontal meridian of the eye an angle of about forty-five degrees, enters the sclerotic at the point indicated. *Without altering the direction*, the knife passes through the anterior chamber in order to make the counterpuncture on the opposite side so that the point of the knife becomes visible in the sclerotic about one millimetre (or less) distant from the cornea. The knife is now pushed forwards, so that its retraction finishes the incision. As soon as the incision is made the eyelid is dropped.

2d Step. The second part of the operation consists in the careful opening of the capsule.

3d Step. In the third part, Daviel's spoon is slightly pressed against the inferior margin of the cornea, and the index finger of the left hand, which holds the upper eyelid, through it exerts a very slight pressure on the highest point of the cornea. Thus the lens is made to rotate a little, its lower margin presses, in the manner already described, against the posterior surface of the iris, pushes the iris forward, passes along it to the margin of the pupil, overcomes the obstacle and places itself freely in the wound, which is made to gape by Daviel's spoon pressing against it. A slight pressing movement of the index finger of the left hand, by means of which the upper eyelid is shifted from above downwards over the cornea, serves to expel the lens. Similar movements of the lids are employed for the purpose of forcing out any *debris* of the cortical substance, after pushing them from behind the iris towards the pupil, by gently rubbing the shut eyelids. Should the pupil then not appear round, but its margin drawn towards the wound, it regains its normal position by an outward shifting of the lower lid; or, if that be not sufficient, by the introduction of Daviel's spoon. Immediately afterwards I put some atropia into the eye and close it by my compressive bandage.—"Soelberg Wells, on the Diseases of the Eye." Bull's Am. Ed., p. 467. 1883.

Lebrun's operation closely resembles Liebreich's, except that the puncture and counterpuncture lie at the edge of the cornea; that the section forms somewhat more of a flap, and lies in the upper half of the cornea.

The operation is to be performed as follows: The lids being kept apart by the speculum and the eyeball fixed, Von Graefe's knife is introduced one or two millimeters below the external extremity of the transverse diameter of the cornea, the cutting edge being turned upwards and slightly forwards, so that the plane of the blade forms an angle of about thirty degrees with that of the iris. The anterior chamber is to be traversed rapidly and the counterpuncture made at a corresponding point of the opposite side of the cornea. The incision is then to be continued upwards in such a manner that it describes a circular curve, the summit of which lies slightly below the upper edge of the pupil when in a medium state of dilatation. Dr. Lebrun terms this "extraction by a small medium flap."—"Soelberg Wells on the Diseases of the Eye." Bull's Am. Ed., p. 468. 1883.

Knapp's Modification of Graefe's Peripheric-linear and Wecker's Flap-section, with Capsulotomy and subsequent Discission of the Capsule.

Both observation and experience induce us to recommend what is known as "Knapp's modification" of the operation for the extraction of cataract,* and as we consider his method of sufficient interest and importance we quote his own words and describe the details of the operation somewhat at length, in the hope of tempting the more progressive and especially the younger members of the profession, to give this method a fair trial, with the full assurance that it offers more advantages and less disadvantages than any other, and, on the basis of statistical data, claims a peculiar influence on the final object of all operations for cataract—the restoration of sight.

In a recent lecture† Knapp makes a synopsis of *thirty extractions*, which serve as a basis for the following remarks, in the course of which he describes in detail the steps of his operation; and we refer to cuts of most of the instruments he employs:

"The *youngest* patient was a servant girl aged thirty-two years, whose cataract I would, under ordinary circumstances, have operated on by division; but as she was blind in both eyes, had only recently come to this country, and was without support, I preferred that operative procedure which restored her sight in the shortest time. There were three patients between forty and forty-eight years of age; the remainder were over fifty. The oldest was eighty-two.

"The *method* was a *more or less linear or low-flap section, with a broad iridectomy, and peripheric opening of the cap-*

* Knapp's previous report of a hundred cases of extraction (the sixth hundred), published in the July number, 1879, of the *Archives of Ophthalmol.*, refers to sixty-six successive cases of extraction with peripheric capsulotomy, and together with the preliminary communication in Vol. VI., and later in Vol. X., No. 3 contains the substance of his views and experience on this subject, also historical and critical remarks on the peripheral opening of the capsule.

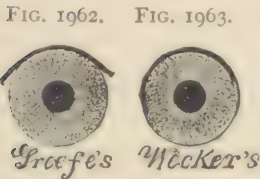
† On the Extraction of Cataract, by Herman Knapp, M.D. *The Medical Record*, New York, Feb. 18, 1882.

OPHTHALMIC.

EXTRACTION OF CATARACT.

Knapp's Method. (Continued.)

sule. In the first operations (Fig. 1962), Graefe's section begins and terminates one millimeter in the corneo-scleral junction, its apex being at the transparent margin of the cornea, or even one or two millimetres below it. Gradually I shifted into the flap-section (Fig. 1963), which De Wecker, of Paris, recommends as the best, namely, a section with a Graefe's knife, situated exactly in the transparent margin of the cornea, extending over its upper third. For full-sized cataracts, I made it somewhat larger. Both sections—the linear and the flap—have their advantages and their disadvantages; the linear does not incline to tilting, and shows a very accurate co-aptation, but as its ends are nearer to the insertion of the iris, it is more liable than the flap to adhesions and incarcerations

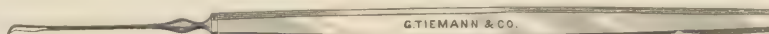


of the iris and to cyclitic processes. With regard to firm closure of the wound, one of the most important factors in the whole operation, the flap, though easily gaping during the whole operation and soon after it, has one redeeming quality—it cuts the lamellæ of the cornea obliquely, not at right angles, as the linear section does. This principle of oblique piercing is frequently made use of, and with admirable ingenuity, in the animal organism. Let me only mention the ductus choledochus piercing the wall of the duodenum obliquely, by which contrivance the bile can, without obstacle, flow into the gut, but the food, while passing from the pylorus onward, will press the inner wall of the valve-like opening of the bile duct against the outer, and thus completely closes the aperture. Somewhat in the same manner the inner lip of the flap-section is pressed against the outer by the contents of the globe, whereby a firm and lasting closure may be established. Theorizing is a fine thing in its way, but worthless without the test of experience, because in complicated problems we commonly fail to know and appreciate the quality and quantity of the co-operating factors. Wecker's section has thus far shown us very kind healings, encouraging to further trial."

The most approved form of speculum, *i. e.* Graefe's modified, is shown (Fig. 1842, page 151). The arms are curved so that the loop of spring and adjusting screw are out of the operator's way. There is a right and left speculum. Fixation forceps (Fig. 1862, page 152), and a typical Graefe's cataract knife (Fig. 1898, page 162).

"The *iridectomy* in almost all of our operations was large. The coloboma varies from one-sixth to one-quarter of the corneal circumference. When the corneal section and the opening of the capsule are peripheric, it must be large, or the columns of the coloboma will be an obstacle to the exit of the lens, which, if overcome by force, entails bruising and incarceration of the iris. When the iris is being cut, it ought not to be dragged with the iris forceps (Fig. 1935, page 165) into the corners of the section, since there the lips of the wound act like clamps, holding the iris-tissue tight between them. It is good practice to seize the iris in the centre of the section, draw it straight up and cut it off close to the cornea—carefully avoiding the corneal tissue itself—in one, two, or three strokes of the iris scissors (page 164, Fig. 1923), as may prove convenient, and afterward, according to the sufficient or insufficient size of the coloboma, either reduce or exsect iris tissue which may still lie in the corners. Such tissue, even after a clean and apparently satisfactory iridectomy, remains hidden in the wound more frequently than we imagine. Proofs: 1. The anatomical examination of eyes on which iridectomy had been made for glaucoma, or combined with cataract extraction, commonly found the stump of the iris or its adjacent tissue united with the corneal scar, even if no outward inspection could discover such a condition. 2. Many times, when passing the cystotome from the corners of an apparently unobstructed corneal section toward the centre, I drew iris-tissue along, which was either the periphery of the adjacent iris, or the stump of the part that had been removed. Such portions, of course, have to be grasped with the forceps and cut off. This observation has taught me not to rest satisfied with an apparently correct coloboma, even if its sphincter edges are in the anterior chamber, but, before opening the capsule, to clear the whole extent of the corneal section, especially the corners, of iris tissue, which, with a delicate probe or spatula, may be stroked back into the anterior chamber."

FIG. 1964.—Knapp's Needle Cystotome.



"When the wound is clean the operator takes the fixing-forceps in his own hand, presses gently with it on the globe, so as to make the corneal section slightly gape, and passes the needle cystotome (see Fig. 1964) from the inner corner of the section to the outer, through the anterior capsule of the lens. This manoeuvre has to be closely watched; a farsighted operator should make himself near-sighted by convex spectacles, and either daylight or artificial light ought to be thrown on the eye by a large convex hand lens, so that the point of the cystotome can be accurately followed in its course through the capsule. An insufficient capsulotomy is commonly without consequences, as the cataract on its way out enlarges the opening; only in tough capsules is an obstacle to the expulsion of the lens, and may lead to prolapse of vitreous. When I had practiced this mode of opening the capsule in about two hundred cases, I varied it, not because I was dissatisfied with its results, but in order not to get wedded to one particular procedure. There is no

OPHTHALMIC.

EXTRACTION OF CATARACT.

Knapp's Method. (Continued.)

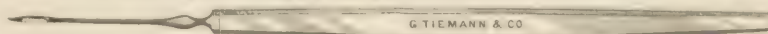
conceivable way of opening the capsule that has not here and there been tried. The one just described is the simplest in execution, and the least injurious to the eye, but it has the disadvantage of necessitating, in the majority of cases, an after-operation, viz.: the subsequent central splitting of the capsule. In order to avoid that, I have lately joined to the horizontal division a larger vertical one than I made a few years ago while practicing a T-shaped opening. A *bent needle cystotome* (Fig. 1948), is introduced into the anterior chamber, and the capsule slit open from the lower edge of a middle-wide pupil up to the centre of the corneal section. In order not to let the outcoming lens enlarge the upper end of the capsular wound irregularly, I made the horizontal incision in one case with a delicate, sharp-pointed scalpel, the point of which was inserted into the upper end of the vertical incision of the capsule at the centre of the corneal section, pushed forward toward one corner of the wound, and then, by raising the hilt, one-half of the upper margin of the capsule was ripped open. In the same way the other half was dealt with. In another case I made the horizontal incision of the capsule with the needle cystotome, which was passed first from one, then from the other corner of the corneal section through the capsule, so as to meet the upper end of the vertical capsular section. If the cystotome were passed from one end of the section to the other, it would split the first half of the capsule, but most likely not the second, for when fallen into the vertical section it would enlarge this by dragging the capsule before it rather than cut it.

"The *expulsion of the lens* is effected by pressing with a hard rubber spoon (Fig. 1952, page 168) on the lower part of the cornea.

"The *after-operation*, the subsequent central division of the capsule, is an essential feature in this mode of operating for cataract. Without it the method could not stand, as it has also virtually been abandoned by the operator who first, in 1873, tried it on a larger scale, namely, Professor Gayent, of Lyons. He made no after-operations, and was dissatisfied with the imperfect visual results. The empty capsule will wrinkle and opacify, requiring subsequent splitting, in the majority of cases. But then the visual results are permanently good, and better than by any other method, except the removal of the lens within the capsule, which, according to its warmest advocate, Dr. Herman Pagenstecher, is indicated in thirty per cent. of the patients only. But do the methods with central opening of the capsule, even in their successful cases, yield good vision permanently? By no means. With them, too, the capsule will wrinkle and opacify, and vision be reduced to a surprising degree.

"The subsequent division of the capsule comprises not only its anterior, but also its posterior half, and, therefore, gives a perfectly unobstructed pupil. The imperfect visual results, after the primary central division of the anterior capsule, have always been felt by the profession, and given the incentive to different attempts at obviating this disadvantage, among which I will mention the puncture of the vitreous, immediately after the expulsion of the lens, which Professor Hasner, of Prague, has made for many years, and which, as I saw last summer, has been adopted, on trial at least, by Schweigger. Both gentlemen assert that this procedure is not dangerous, but neither has, as yet, published statistics to convincingly support their assertion. The subsequent division of both capsules is an innocent operation; I have done it more than a hundred times. Only in a few cases the reaction from it lasted longer than a few days, and never was the vision made worse. The technique of the operation, however, is peculiar and has to be learned. The operation requires, above all, two things, without which nobody should undertake it; first, *good artificial light*, thrown on the eye with a large lens, so that during the operation every wrinkle, dot and stria of the capsule can be seen, as well as the course and effect of the needle; second, a *sharp, well-proportioned scalpel needle*, with

FIG. 1965.—Knapp's Scalpel Needle, for Capsulotomy.



which the capsule can be cut without tearing. I first make a horizontal incision, then a vertical one, varying them, however, according to the conditions of the capsule. No aqueous should, none need escape. I have described it in the *Archives of Ophthalmology*, Vol. VIII., No. 2, p. 200, Vol. X., No. 3, p. 295."—CHARLES S. TURNBULL, M. D., *Medical and Surgical Reporter*, May 8, 1882.

FIG. 1966.—Bradford's Twin Cataract Needle.



The object in having the needles move laterally is that they will be of such a width as to puncture and hold any capsule, according to the size of its pupil, without injuring the iris. When in that position a crochet needle, the size of a stop needle, can be inserted and the capsule torn without losing any aqueous and without any pulling upon the ciliary region, as all strain must come between these three points and is exerted from the centre outwards.

OPHTHALMIC.

FOR THE EXTRACTION OF SOFT CATARACT.

FIG. 1969.—Wecker's Canulated Needle.

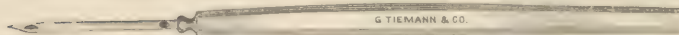


FIG. 1970.—Blanchet's Instrument for Exhausting Soft Cataract.

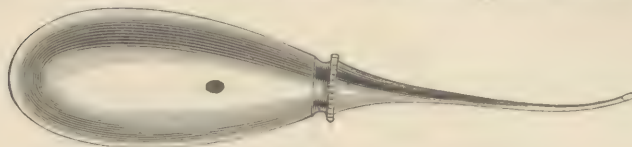


FIG. 1971.—Teale's Instrument for Exhausting Soft Cataract.

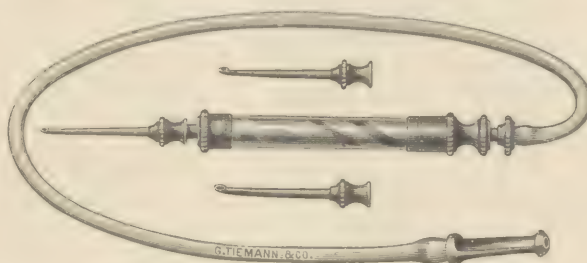


FIG. 1972.—Bowman's Instrument for Exhausting Soft Cataract.



FIG. 1968.—Walton's Grooved Needle, for Soft Cataract.



FIG. 1967.—Levi's Needle, with an Eye.



Suction.

This method is applicable to soft cataracts only. *Langier* plunged into the cataract a hollow needle with an opening near its point. This needle is attached to a small syringe, whose piston, being put in action, sucks the opaque humor from the cataract. *Blanchet* operated by means of suction upon liquid cataracts, but he introduced his needle through the cornea, and instead of a syringe to draw out the cataract, used a small india-rubber bag, which being compressed and left to its own elasticity, sucks out the opaque liquid with more or less rapidity.—“*Bernhard and Huette's Manual of Operative Surgery.*” Van Buren and Isaacs' Am. Ed., p. 153. 1857.

* * * *Mr. Teale* makes a puncture in the cornea with a broad needle, at a point opposite the margin of the fully dilated pupil, and, passing obliquely through the substance of the cornea, the instrument should enter the anterior chamber at a point opposite the margin of the pupil when of medium size. Such a valvular opening will prevent any scar in front of the pupil and diminish the risk of prolapse or an anterior synechia. The capsule having been freely divided, the curette should be carefully introduced through the corneal wound and its end (the opening looking towards the cornea) held steadily in the area of the pupil and gently buried in the opaque matter, the convex surface being pressed somewhat back towards the posterior capsule. The suction power should then be carefully applied and continued in gentle inspirations as long as any opaque matter comes forward into the pupil, and, when the latter is quite clear, the instrument is withdrawn.—“*Soelberg Wells on Diseases of the Eye.*” Bull's Am. Ed., p. 477. 1883.

FIG. 1973.
Teale's Instrument for Soft Cataract, in Case.

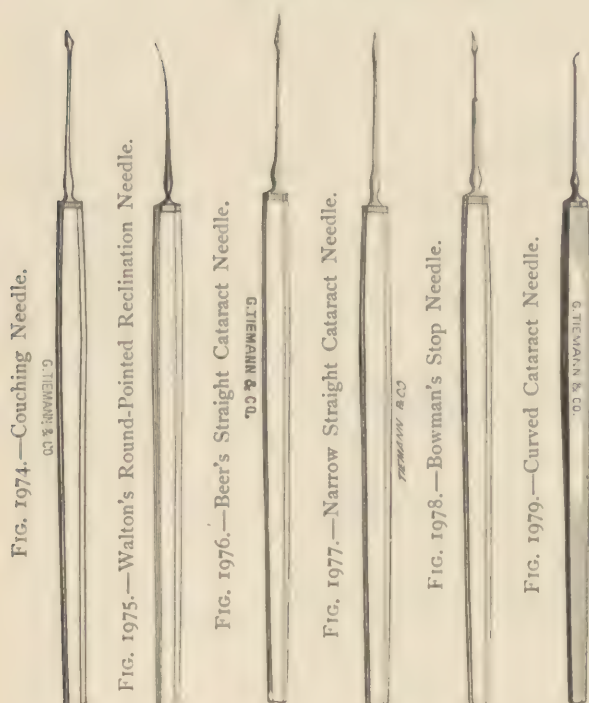


OPHTHALMIC.

THE NEEDLE OPERATIONS FOR CATARACT.

Keratonyxis, Scleronyxis. Couching, Depression, Reclination (*Abaissement ou Déplacement de la Cataracte.*)

Cataract Needles.



This consists in passing a cataract needle through the sclerótica and subjacent membranes, a little above the transverse diameter of the eye, and at about two lines distance from the circumference of the transparent cornea, until the point arrives in the posterior chamber of the eye. With this the crystalline is depressed to the outer and lower part of the globe of the eye, where it is left. This operation is, however, mainly of historical interest, being now almost abandoned.—Dunglison.

A certain modification of depression, when the needle is made to carry the lens from before backwards into the vitreous humor and then depresses it, so that its anterior aspect becomes its superior, is called *reclination*.

Division, Discission, Solution of Cataract.

The object of this operation is to lacerate the anterior capsule with a fine needle, so as slightly to break up the surface of the lens and to permit the aqueous humor to come into contact with the lens substance, which, imbibing the fluid, softens and becomes gradually absorbed. * * * There are two operations for division: 1st. Through the cornea, *Keratonyxis*, or the anterior operation for absorption; and, 2d. Through the sclerótica, *Scleratomyxis*, or posterior operation for absorption.

Keratonyxis.—A fine needle—Bowman's Stop—is introduced through the cornea, at a point lying well within the field of the dilated pupil, so that the iris may not be touched by the stem of the needle, with the point of which the lens is then broken up.

Scleronyxis.—Is applicable to partially absorbed cataracts, lying deeply behind the iris. The instrument used for this purpose is the Hays' (or other) Knife-needle, with which the division of the lens of considerable hardness can be accomplished.

Capsular and Secondary Cataracts.

If, in an operation for senile cataract, the capsule is found too hard and tough for the cystotome, it is torn across with a sharp hook (Fig. 1922), and then, after extraction of the lens, the capsule is removed by the hook, or by a pair of forceps. If the connection between the capsule and the hyaloid is loosened, the lens may often be readily extracted in its capsule by the hook. Some operators divide the capsule across with a knife.

Dr. Agnew, of New York, passes a stop needle through the centre of the membrane, thus fixing both the eye and the latter; he then makes a linear incision on the temporal side of the cornea, through which he passes a sharp pointed hook, the point of which is passed into the same opening in the membrane as the needle. He now tears the membrane, and by a rotary movement of the hook rolls it up around the latter, and then either draws it out altogether, or, if this cannot be done, he tears it widely open.

For cases in which severe and protracted inflammation has followed the removal of cataract, giving rise to a dense secondary cataract, *Dr. Noyes*, of New York, has devised the following operation: He makes a puncture at the centre of the outer margin of the cornea with Von Graefe's cataract knife, carries it across the anterior chamber, and makes the counter-puncture at a corresponding point on the opposite side; he then partially withdraws the knife until its point arrives opposite the middle of the iris, when he plunges it backwards through the false membrane into the vitreous, making the wound as large as possible. After withdrawal of the knife, a small blunt hook is to be passed through each corneal wound and caught in the wound made in the false membrane and traction made in opposite directions, so as to drag out a portion of tissue at each corneal wound, where it is to be snipped off. Thus a large central pupil will be made.—"Soelberg Wells, Diseases of the Eye." Bull's Am. Ed. p. 482. 1883.

OPHTHALMIC.

For the Coloring of White Spots in the Cornea.

FIG. 1980.—Agnew's Spring Tattoo.



FIG. 1981.—Grooved Tattooing Needle.



FIG. 1982.—Baader's Tattooing Needle.



FIG. 1983.—Agnew's Tattooing Needle.



The substance which De Wecker recommends is india ink ; Mr. Taylor has also employed with advantage, sepia, ultramarine and other colors, and, when an immediate and deeply-colored effect has been desired, a combination of lampblack with india ink or a solution of nitrate of silver. The needles are dipped into the pigment solution, which should be made as thick as possible, and, the eye being steadied, the superficial layers of the cicatrix are rapidly punctured in an oblique direction and layers of the solution applied, just as in the ordinary tattooing.—*American Journal of Medical Sciences*, October, 1872, p. 561.

* * * or, use the grooved needle, rub up the india ink to a thick solution, and cover the leucomatous spot thickly with it ; then fill the groove of the needle with the pigment, and puncture the cornea obliquely in various directions.—“*Soelberg Wells, Diseases of the Eye.*” Bull's Am. Ed., p. 245. 1883.

For Enucleation or Extirpation of the Eyeball.

FIG. 1985.—Ball's Double Hook, for Extirpation.



FIG. 1986.—Enucleation Scissors.



FIG. 1984.—Blitz's Extirpation Forceps.



SCALPES AND BISTOURIES,	-	-	-	-	see page 84.
DISSECTING FORCEPS,	-	-	-	-	“ 15, 19.
NEEDLES AND LIGATURE,	-	-	-	-	“ 78, 79.
DRESSING,	-	-	-	-	“ 74.

FIG. 1987.—Bulldog Forceps, for drawing out the Eye.

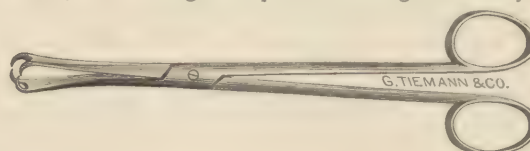


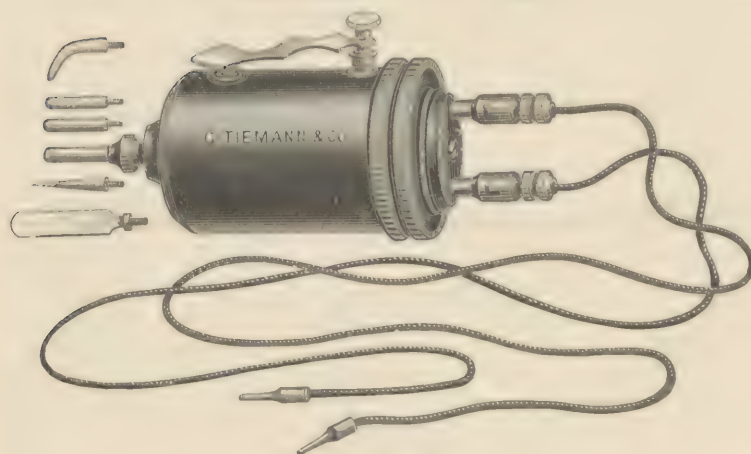
FIG. 1988.—Wells' Enucleation Spoon.



OPHTHALMIC.

THE ELECTRO MAGNET IN OPHTHALMIC SURGERY.

FIG. 1989.—Bradford's Electro Magnet.



The rapidly extending use of the electro magnet for the purpose of removing fragments of iron and steel from the interior of the eye, the slight attention previously bestowed on this method of procedure, and the imperfect knowledge of the subject displayed in many of the published articles, have induced me to bring forward the following views. They are the result of several years' practical study. And their main object is to demonstrate that in the application of a properly constructed magnet we possess an efficient means of treating cases for which enucleation has hitherto been practically considered the sole resort.

Magnetism may be applied to the eye from either a permanent or an intermittent source; that is, either from a so-called permanent magnet, which, once excited, retains its magnetic power indefinitely, or from a magnet which becomes such only when excited by the electric current. And the superiority of the latter is incontestible. It exceeds its rival by many times in power, when of less weight and smaller size. The permanent magnet is, moreover, open to the objection of being liable to a constant dissipation of its energy upon receiving any sudden shock or blow, upon moving across the magnetic meridian of the earth, and even when at rest, unless guarded by an armature whose weight nearly equals its suspensive power.

The electro-magnet must then be the one employed for the purposes of ophthalmic surgery. And in modeling such an instrument for use about the eye, it is evident that we must combine the minimum of size with the maximum of power. To this may be added, for the sake of convenience, with the smallest and most compact battery that proves itself available. * * *

The core is composed of soft Norway iron, one-third of an inch in diameter, and two and one-half inches in length; to one end of this solid cylinder is riveted a flat circular disk of the same material, one inch in diameter, and one-sixteenth inch thick.

The surrounding helix is composed of insulated copper wires, weighing twenty-nine grains to the foot, making eight convolutions of one and three-quarters inch in length.

The polar extensions are respectively *five, four and three* thirty-seconds of an inch in diameter, and one-half inch in length; their suspensive power equals twenty, sixteen and eleven ounces each, when an armature of soft iron, one inch by one-tenth in diameter is used, which is within two ounces of the saturation point. These points can be made of any size or shape to suit.

The battery used is a single bichromate of potash cell, having eight square inches of negative surface. The magnet weighs about five ounces, and the intensity of its field by the addition of another cell is made as great as that of a magnet capable of lifting a ton.

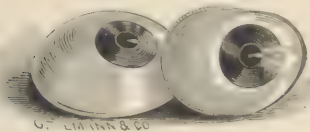
* * * the larger the fragment the more probable its removal, and, conversely, the smaller the fragment the more difficult its extraction. Finally, a point may be reached where the resistance to be overcome exceeds the amount of polarity capable of being induced. This is illustrated in the case of minute foreign bodies in the cornea, where the magnet is of no avail. All incisions for removal of foreign bodies anterior to the plane of the lens should be marginal incisions of the cornea, those that concern the vitreous should be scleral, and made posterior to the ciliary border; in both cases, by so doing, the ciliary body is avoided, and in the latter case the surrounding tissues form the best support for the wound.

One important point in regard to all incisions made for the entrance of the magnet, and the removal of a foreign body from the eye, is that the cut should be not one with parallel edges, but *T-shaped*, as in the former case, when the extraction of the foreign body takes place, it is invariably stripped off the end of the magnet, and is retained at the site of the wound, or drops into the interior of the eye. This is a foregone conclusion unless the lips of the wound be held apart, and no amount of skill or carefulness upon the part of the operator can guard against it, unless the incision is of the above-mentioned shape.—HENRY W. BRADFORD, M.D. Extract from *Boston Medical and Surgical Journal*, March 31, 1881.

OPHTHALMIC.

ARTIFICIAL EYES.

FIG. 1990.—Artificial Eyes.



An artificial eye is a shell of enamel, representing the front of the eyeball, the loss of which it is intended to conceal. It should be of such shape as to admit of being introduced behind the eyelids, and of fitting, by its hollow posterior surface, over, but without touching or at least pressing on, the stump-like remains of the eye, and, by its margins, into the folds formed by the reflection of the palpebral and ocular portions of the conjunctiva into each other.

The cases best adapted for the wearing of an artificial eye are those in which the eye, at the same time that it has been destroyed as an organ of vision, has been reduced in size, viz.:

1st. Those cases in which the cornea is destroyed by purulent ophthalmia, whether in adults or new-born infants, by gonorrhœal ophthalmia, various ophthalmia, &c., and in which staphyloma has not resulted, but the cicatrice formed in the place of the cornea is flat.

2d. Those cases in which the eye is intentionally reduced to the state just described, by the operation for staphyloma, common or sclerotic.

When the remains of the eye are of a very small size, as after the loss of much or all of the vitreous humor, as may happen from the bursting of the eye in purulent ophthalmia, or in ocular phlegmon, or during the operation for staphyloma, there is not a good support for an artificial eye. After extirpation of the eyeball there is no support at all. Cases of atrophy of the eyeball do not, in general, bear the wearing of an artificial eye.

Of course, before the use of an artificial eye is thought of, the remains of the eye must be perfectly cicatrized, and the conjunctiva free from inflammation and morbid sensibility.

An artificial eye, besides resembling the opposite sound eye in prominence and in the color and appearance of the iris, ought, if the stump be good, to move in concert with it; this it does by following the movements communicated to the conjunctival folds, into which its margins are fitted, by the movements of the stump. It ought, at the same time, to cause no pains or uneasiness.

Introduction of an Artificial Eye.—Raise the upper eyelid and slide the artificial eye, previously dipped in cold water, up behind it by the end which is to correspond to the temporal angle. Then, turning this end towards the temporal angle, and letting the upper eyelid fall, depress forcibly the lower, and make the lower edge of the artificial eye slip into the lower palpebral sinus. This being done, and the lower eyelid allowed to rise, the introduction of the artificial eye is accomplished.

Removal of an Artificial Eye.—This is done by an opposite procedure, viz.: by depressing the lower eyelid, and with a large pin, or a bit of wire bent like a hook, or even with the thumb nail, hooking the lower edge of the eye out from the lower palpebral sinus, whereupon the eye will glide down from behind the upper eyelid and fall into the hand ready to receive it. In doing this himself, the patient should lean his face over a soft cushion, or the like, in order that if the eye should slip out of his fingers it may not be broken in the fall. The artificial eye is withdrawn on going to bed. Immediately on being withdrawn, it is to be put into water in order to cleanse it from the mucus which may be adherent to it. Both before putting in the artificial eye, and after withdrawing it, the person should bathe his eye with water, tepid or cold. The artificial eye in the course of a few months becomes rough, from the slow corrosive action of the humors which come into contact with it, and requires to be exchanged for a new one. As it is also liable to be broken by accident, several should always be kept on hand.—“Jones’s Ophthalmic Medicine and Surgery.” Am. Ed., p. 188. 1863.

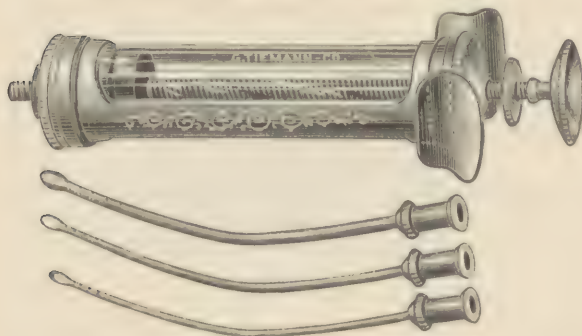
We have on hand a large assortment of all colors, forms and sizes, for the right and left eye, from which personal selections may be made, or we can send them by mail; but as the success of being well matched depends on the exactness of the description and the minuteness of adaptation and accommodation of the artificial eye to the remains of the natural one, we advise patients to apply to their physician and have him send us the following particulars:

1. Right or left eye?
2. Diameter of the iris of the well eye.
3. Normal diameter of the pupil.
4. Degree of atrophy of globe in comparison to well eye.
5. Form of anterior of stump, flat, round or conical.
6. Partial or entire presence or absence of cornea remaining transparent.
7. Depth of furrow behind the lower lid.
8. Sex and age of patient.
9. A drawing (natural size) representing accurately the eye region of both eyes, the color of the iris and sclerotica (or a minute description).

OPHTHALMIC

SUNDRIES.

FIG. 1991.—Tansley's Lachrymal Syringe.



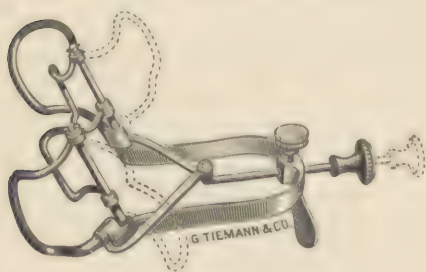
by the closure of the lower opening—and is caught by a napkin held to the eye for that purpose. If one syringe full is not sufficient, the cylinder may be unscrewed from the canula, filled and emptied again, as before described. The canal and sack can thus be perfectly washed, or an application be perfectly made without a drop of the liquid used passing into the nose or throat of the patient.

FIG. 1992.
Prince's Medicating and
Drainage Canula.

Prince's Medicating and Drainage Canula is designed to facilitate the treatment of lachrymal stenosis, purulent dacryocystitis and fistula. The accompanying syringe, which fits the visible end of the canula, enables the *patient* to irrigate with warm salt water or peroxide of hydrogen, thus absolutely removing all pus or mucus. The medicating fluid, similarly applied, escaping from the apertures of the canula, comes in contact with the entire surface of the sac and duct.

By using the accompanying lachrymal cocaine pipette (ten per cent. solution), the surgeon is enabled, without an anæsthetic, to slit, probe and introduce the canula, which is worn until the discharge shall have ceased or the tendency to constrict shall have been overcome.

FIG. 1994.—Bradford's Eye Speculum.



The use of this speculum is in cataract and glaucoma operations, when the pressure of the lids upon the globe is very liable to force the vitreous out, and as the lids are raised entirely clear from the globe with this instrument, the more force the patient uses to contract the lids the higher the lids are carried from the globe. I think it will come in common use, as it is the only speculum that does this.—H. W. BRADFORD, M. D.

The peculiarity of this lachrymal syringe is that the canula or nozzle is closed at its extremity with a solid olive-shaped bulb, just above which there are a number of small openings which pass directly through the canula, permitting the liquid—when the piston is pressed—to pass out laterally in a number of jets.

The bulbous point permits of an easy introduction and a passage through the canal with the least traumatism to its walls; having been passed directly through and into the nasal cavity, the canula is drawn upwards, until the bulb closes the lower opening of the canal; then, if the piston is pressed, the liquid passes into the cavity, and applying itself to every part of the canal and sack, it escapes from the inner canthus—being prevented from passing downwards

FIG. 1993.—Prince's
Lachrymal Syringe.

Natchet's Complete Set of Trial Glasses.

- Fig. 1753. Fine rosewood Case; contains:
- 30 pairs each of Spherical, Convex and Concave Lenses, from $1\frac{1}{8}$ to 148 inches focus.
 - 18 pairs each of Cylindrical, Concave and Convex Lenses, from 6 to 148 inches focus.
 - 10 Prisms of angles from 2 to 20 degrees.
 - 4 Plane Glasses of assorted colors.
 - 1 Plane White Glass. 1 Half-ground Glass.
 - 2 Metal Disks with slits of assorted widths.
 - 1 each Metal Disks, solid and with central perforation.
- All mounted in gilt and silver-plated metal rims, with handles.
- 1 Adjustable Spectacle Frame for the various Lenses, graduated for reading the astigmatic axis of the eye.
 - 1 Horn Lens Holder.

OPHTHALMIC.

OPERATING CASES.

Set of Strabismus Instruments.

\$9.50.

- 1 Plain Wire Speculum.
- 2 Strabismus Hooks.
- 1 Double Hook, Sedillot's.
- 1 Strabismus Forceps.
- 1 Strabismus Scissors.
- 1 Morocco-covered Case.

Compact Set of Eye Instruments.

\$28.

- 1 Plain Wire Speculum.
- 1 Strabismus Hook.
- 1 Beer's or Graefe's Cataract Knife.
- 1 Angular Iridectomy Knife.
- 1 Straight Cataract Needle.
- 1 Curved Cataract Needle.
- 1 Desmarre's Lid Holder.
- 1 Cystotome and Daviel's Spoon.
- 1 Straight Scissors. 1 Curved Scissors.
- 1 Plain Fixation Forceps. 1 Straight Iris Forceps.
- 1 Cilia Forceps.
- 1 set Bowman's Probes.
- 6 Suture Needles and Silk.
- 1 Rosewood Case, lined with silk velvet.

Ayres' Small Set of Eye Instruments.

\$49.25.

- 1 Graefe's Cataract Knife.
- 1 Bistoury for Lid Operations.
- 1 Cystotome, flexible shank, and Daviel's Curette.
- 1 Angular Iridectomy Knife, medium.
- 1 Weber's Curved Canaliculus Knife.
- 1 Discission Needle.
- 1 Strabismus Hook.
- 1 Desmarre's Paracentesis Needle.
- 1 Dix's Spud.
- 1 Desmarre's Lid Elevator.
- 1 Jaeger's Elevator and Spatula combined.
- 1 Graefe's Eye Speculum, reversible.
- 1 Fixation Forceps, spring catch.
- 1 Iris Forceps, curved.
- 1 Iris Scissors, curved on the flat.
- 1 Strabismus Scissors, straight.
- 1 Enucleation Scissors.
- 4 Probes for Nasal Duct (Ayres' modification of Bowman's).
- 1 Entropium Forceps, reversible.
- 1 Cilia Forceps.
- 6 Suture Needles and Silk.
- 1 Sand's Needle Holder.
- 1 Rosewood Case, not lined, except the tray that contains the scissors and the bridges for the cutting instruments.

Ayres' Large Set of Eye Instruments.

\$84.65.

- 2 Graefe's Cataract Knives.
- 2 Bistouries for Lid Operations.
- 1 Cystotome, flexible shank, and Daviel's Curette.
- 2 Angular Iridectomy Knives, medium and small.
- 1 Weber's Curved Canaliculus Knife.
- 1 Bowman's Stop Needle.
- 1 Discission Needle, curved.
- 1 Tyrrell's Blunt Hook.
- 2 Strabismus Hooks.
- 1 Cystotome, flexible shank, and Hard Rubber or Shell Spoon.
- 1 Knapp's Foreign Body Hook.
- 1 Spud.
- 1 Spatula for the Iris.
- 2 Lid Elevators, large and small.
- 2 Graefe's Eye Specula, right and left.
- 1 Fixation Forceps, medium.
- 1 Fixation Forceps, broad.
- 1 Iris Forceps, curved.
- 1 Iris Scissors, curved on the flat.
- 1 Strabismus Scissors, straight.
- 1 Enucleation Scissors.
- 1 Canaliculus Scissors.
- 4 Probes, Ayres' modification of Bowman's.
- 1 Sands' Needle Holder.
- 6 Needles and Silk.
- 1 Anel's Probe.
- 1 Dressing Probe.
- 1 Knapp's Entropium Forceps.
- 1 Canaliculus Syringe, one straight and one curved point.
- 1 Cilia Forceps.
- 2 Serrefines.
- 1 Jaeger's Lid Holder and Spatula.
- 1 Test Drum.
- 1 Rosewood Case, not lined, except the tray that contains the scissors and the bridges for the cutting instruments.

Agnew's Set of Eye Instruments.

\$66.50.

- 2 Graefe's Eye Specula.
- 1 Graefe's Fixation Forceps, spring catch.
- 1 Desmarre's Double Lid Retractor.
- 1 Agnew's Lachrymal Syringe, with two pliable silver points.
- 1 set Theobald's Lachrymal Probes.
- 1 Bowman's Lachrymal Director, gilt.
- 1 Weber's Probe.
- 1 Agnew's Lachrymal Knife, with long pliable shank.
- 1 Prout's Needle Holder.
- 1 Strabismus Scissors, straight small blunt points.
- 1 Large Straight Scissors.

(OVER.)

OPHTHALMIC.

OPERATING CASES.

Agnew's Set of Eye Instruments (continued).

- 1 Delicate Scissors, curved on the flat, sharp points.
- 1 Agnew's Strabismus Hook, with eye.
- 1 Plain Strabismus Hook.
- 1 Agnew's Tattooing Needle.
- 1 Beer's Cataract Knife.
- 1 Graefe's Linear Cataract Knife.
- 1 Liebreich's Linear Cataract Knife.
- 1 Cystotome and Daviel's Curette.
- 1 Small Cataract Needle.
- 1 Ivory-handle Shell Spoon.
- 2 Bowman's Stop Needles.
- 1 Delicate Curved Iris Forceps.
- 1 Tyrrell's Sharp Hook.
- 1 Iridectomy Knife, angular.
- 1 Desmarre's Paracentesis Needle.
- 1 Large Enucleation Scissors, curved on the flat.
- 12 Suture Needles and Silk.
- 1 Rosewood, brass-bound Case, lined with silk velvet.

Gruening's Set of Eye Instruments.

\$71.

- 2 Scalpels, 2 sizes.
- 2 Cataract Knives, Graefe's.
- 1 Lance-shaped Iridectomy Knife.
- 1 Hard Rubber Cataract Spoon.
- 1 Wire Spoon.
- 1 Cystotome with Daviel's Spoon.
- 1 Knapp's Needle-Knife.
- 1 Gouge, for foreign bodies.
- 1 Weber's Canaliculus Knife.
- 1 Discission Needle.
- 2 Lid Retractors.
- 2 Strabismus Hooks, 2 sizes.
- 1 set Theobald's Lachrymal Probes.
- 2 Landolt's Specula.
- 6 Small Curved Suture Needles.
- 6 Larger Curved Suture Needles.
- 1 skein China Bead Silk.
- 1 Sands' Improved Needle Forceps.
- 1 Gruening's Epilating Forceps.
- 1 Curved Iridectomy Forceps.
- 1 Straight Iridectomy Forceps.
- 1 Curved Iridectomy Scissors.
- 1 Straight Strabismus Scissors.
- 1 Jaeger's Hard Rubber Plate.
- 1 Fixation Forceps, with spring catch.
- 1 Plain Fixation Forceps.
- 1 Knapp's Entropium Forceps.
- 1 Slide-catch Artery Forceps.
- 1 Cocaine Case, with dropper.
- 1 Atropine Case, with dropper.
- 1 Platinum Cautery Probe. 1 Test Drum.
- 1 Morocco Case, lined with silk velvet.

Graefe's Set of Eye Instruments.

\$46.

- 1 Beer's Cataract Knife.
- 1 Graefe's Cataract Knife.
- 1 Lance-shaped Iridectomy Knife, straight.
- 1 Iridectomy Knife, angular.
- 1 Desmarre's Scarifier.
- 1 Weber's Fistula-Lachrymalis Knife.
- 1 Discission Needle.
- 1 Paracentesis Needle.
- 1 Cystotome, with Daviel's Spoon.
- 1 Curved Eye Scissors.
- 1 Straight Eye Scissors.
- 2 Desmarre's Lid Holders.
- 1 Fixation Forceps, Graefe's.
- 1 Iris Forceps.
- 1 Cilia Forceps.
- 2 Strabismus Hooks.
- 1 Jaeger's Lid Plate.
- 1 set Bowman's Probes.
- 1 Anel's Probe.
- 1 Desmarre's Entropium Forceps.
- 1 Graefe's Eye Speculum.
- 6 Suture Needles and Silk.
- 1 Rosewood Case, lined with silk velvet.

Knapp's Set of Eye Instruments.

\$73.75.

- 2 Desmarre's Lid Holders.
- 1 Fixation Forceps.
- 1 Artery and Needle Forceps.
- 1 Porte Caustic.
- 2 Bistouries.
- 1 Knapp's Lid Clamp.
- 1 Strabismus Scissors.
- 2 Strabismus Hooks.
- 1 set Bowman's Probes.
- 2 Graefe's Knives.
- 1 Himley's Blunt Hook.
- 1 Needle Cystotome, with Daviel's Spoon.
- 1 Canalicula Knife.
- 2 Knapp's Discission Needles.
- 1 Beer's Cataract Knife.
- 1 Iris Forceps.
- 1 Iris Scissors.
- 1 Foreign Body Needle.
- 1 Grooved Foreign Body Hook.
- 1 Anel's Syringe, with Meyer's Nozzle.
- 1 Sharp Spoon.
- 1 Cilia Forceps.
- 1 Wire Speculum (neutral), made to fit both eyes.
- 1 Sulphate of Copper Crystal, mounted in a camel's hair brush.

OPHTHALMIC.

OPERATING CASES.

Knapp's Set of Eye Instruments (continued).

- 3 Curved Suture Needles.
- 1 Cane Pin.
- 1 Small Anatomical Forceps.
- 1 Large Curved Hook, for Cataract Extractions.
- 1 Large Curved Scissors, for Enucleation.
- 1 Canalicula Probe, fine point, and Weber's Cone.
- 1 Horn Plate.
- 1 Scarpa's Style.
- 3 Perforated Silver Drainage Tubes.
- 1 Morocco Case, lined with silk velvet.

Mittendorf's Set of Eye Instruments.

\$50.

- 1 Mittendorf's Plain Wire Speculum.
- 2 Noyes' Mod. Graefe's Knives.
- 1 Iridectomy Knife.
- 1 Agnew's Canaliculus Knife.
- 1 Cystotome and Scoop.
- 1 Cataract Scoop (Shell).
- 1 Bowman's Stop Needle.
- 1 Straight Cataract Needle.
- 2 Strabismus Hooks.
- 1 Lid Retractor.
- 1 Prout's Reversible Entropium Forceps.
- 1 Small Scalpel.
- 1 Curved Iris Scissors.
- 1 Curved Strabismus Scissors.
- 1 Fixation Forceps, spring catch.
- 1 Cilia Forceps.
- 1 Curved Iris Forceps.
- 1 Prout's Needle Forceps.
- 1 set Bowman's Probes, 1 to 8.
- 3 Small Curved Suture Needles.
- 1 Heurteloup's Artificial Leech Cylinder.

Noyes' Set of Eye Instruments.

\$70.

- 2 Desmarre's Lid Retractors.
- 1 Plain Wire Speculum.
- 1 Noyes' Plain Canaliculus Knife.
- 1 set Theobald's Probes.
- Some Lead Wire, Nos. 4 to 8.
- 1 Small Scalpel.
- 1 Hard Rubber Lachrymal Syringe.
- 2 Strabismus Hooks, large and small.
- 1 Strabismus Scissors.
- 1 Enucleation Scissors.
- 1 Straight Iris Scissors.
- 1 Curved Iris Scissors.
- 1 Fixation Forceps.
- 1 Plain Dissecting Forceps.
- 1 Dix's Foreign Body Spud.

(OVER.)

Noyes' Set of Eye Instruments (continued).

- 1 Spatula.
- 1 Straight Iridectomy Knife.
- 1 Angular Iridectomy Knife.
- 1 Short Iris Forceps.
- 1 Large Curved Iris Forceps.
- 1 Tyrrell's Blunt Hook.
- 2 Straight Discission Needles.
- 1 Graefe's Linear Cataract Knife, wide pattern.
- 2 Graefe's Linear Cataract Knives, narrow pattern.
- 1 Small Sharp Iris Hook.
- 1 Prout's Entropium Forceps.
- 1 Cystotome and Curette.
- 1 Sands' Needle Forceps.
- 6 Small Curved and 3 Straight Suture Needles, and fine Silk.
- 1 Hard Rubber Spoon.
- 1 Noyes' Lens Spoon.
- 1 Rosewood brass-bound Case, lined with silk velvet.

Webster's New York Polyclinic Eye Set.

\$72.

- 2 Graefe's Long Eye Specula.
- 2 Angular Iridectomy Knives.
- 1 Graefe's Linear Cataract Knife.
- 1 Liebreich's Linear Cataract Knife.
- 1 Knapp's Knife-Needle.
- 1 Daviel's Curette and Broad Paracentesis Needle.
- 1 Tyrrell's Sharp Hook.
- 1 Agnew's Lachrymal Knife, long pliable shank.
- 1 Small Cataract Needle.
- 1 Scalpel.
- 1 Gouge.
- 1 Bowman's Stop Needle.
- 1 Knapp's Cystotome.
- 1 Beer's Knife.
- 1 Ivory Handle Shell Lens Spoon.
- 1 Agnew's Lachrymal Syringe.
- 1 set Theobald's Lachrymal Probes.
- 1 Weber's Probe.
- 1 Test Drum, for testing the edges of instruments.
- 1 Curved Strabismus Scissors.
- 1 Straight Strabismus Scissors.
- 1 Curved Iris Scissors.
- 1 Straight Iris Scissors.
- 1 Straight Strabismus Forceps.
- 1 Cilia Forceps.
- 1 Delicate Curved Iris Forceps.
- 1 Large Scissors, curved on the flat, for Enucleation.
- 1 Sands' Needle Holder.
- 1 Graefe's Fixation Forceps.
- 1 Large Straight Scissors.
- 12 Suture Needles and Silk.
- 1 Morocco Case, lined with silk velvet.

AURAL.

"The practice of Otology in this country was, a few years since, almost exclusively confined to charlatans; but it is now cultivated by a class of men who are the equals of any in the profession. Ten years ago, in most parts of the country, those who wished advice upon a disease of the ear were forced to seek aid outside of the medical profession. At the present time, there can be found those in the large cities who are constantly and successfully treating aural diseases; and all over the land the old and familiar advice—'not to meddle with the ear'—is growing far less frequent. The day will soon arrive—if, indeed, it be not already upon us—when Otology will take equal rank with Ophthalmology, to which department it has so long been a mere appendage, and when some knowledge of the diseases of the ear and of their treatment will be required of every practitioner."—"Treatise on the Diseases of the Ear." St. John Roosa. 1873.

Perforating the Lobe of the Ear.

FIG. 1995.—Ear Trocar.



This operation, the object of which is the insertion of ear-rings, is performed with a small trocar (Fig. 1995), whose canula has a removable point. A cork is placed behind the ear as a support for the lobe. The point of the trocar, after passing through the lobe, is buried in the cork, with which it is removed from the canula. The latter is left in situ to aid in the introduction of a leaden wire or silken cord, which is tied in the form of a ring and allowed to remain until the wound is cicatrized and become converted into a permanent opening suitable for the reception of earrings.

Wounds of the Auricle.

"Even those wounds which include the cartilagenous portion of the ear close very speedily when brought together by numerous fine sutures."—"The Principles and Practice of Surgery." Hamilton, p. 583. 1872.

Absence and Obstruction of the Auditory Canal.

"The congenital absence of the meatus auditorius, caused by consolidation of its bony parieties, is beyond the resources of art; but when a membrane, more or less thick, situated deeply or otherwise, obliterates the canal, *puncture, incision* and *cauterization* have been successfully employed.

"It is always prudent to begin with an exploring puncture, to determine the existence of a cavity behind the membrane; if, by this puncture, the hearing is improved, a crucial incision of the membrane may be made and the flaps excised. Some dilating substance should be introduced into the artificial opening to keep it patent and prevent its obliteration during the healing of the wound (such as catgut, tupelo, prepared sponge), which may afterwards be replaced by a canula of gold or ivory (or hard rubber), to keep up the dilation.

"Whatever method is adopted, the surgeon should proceed carefully and be wary of creating lesions in the internal ear."—"Bernhard and Huette's Manual of Operative Surgery." Van Buren and Isaac's Am. Ed. 1857.

The experience of the profession is against the attempts to open the canal to an organ which will probably be found so imperfect that sound cannot be perceived by it.

"By means of the tuning fork we may always determine, in the case of persons of sufficient age, whether the central apparatus be or be not unimpaired. If the canal be closed, while the labyrinth is intact, the vibrations of a tuning fork whose handle is placed on the teeth or forehead will be heard more distinctly in the affected than in the sound ear. The reflection of the sound waves is diminished by the stoppage of the auditory passage, just as in cases of inspissated cerumen and thickening of the mucous membrane of the cavity of the tympanum and the eustachian tube, or perhaps there is no nervous apparatus on that side to receive the sound waves."—"Treatise on the Diseases of the Ear." St. John Roosa, p. 105. 1873.

Auro - Nasal.

"That the nasal and post-nasal regions are inseparably associated with the ear, both anatomically and physiologically, is a trite fact in otology. It is not so clearly realized, however, that diseases of these cavities implicate the auditory apparatus in such a manner that the latter can only be successfully treated by therapeutic measures, directed in the first place to the nose and its adjacent structures. The recognition of this fact is a comparatively new department in aural practice. Its importance in this relation cannot be over-estimated."—"Post-nasal Catarrh." Woakes. 1884.

DIAGNOSTIC.

"It is by no means necessary that every aural patient should be examined with the so-called rhinoscope, nor will the most accomplished manipulator be liable to see the mouth of the eustachian tubes in every case; but, every one who attempts to treat the disease of the organ of hearing will find his diagnosis is very often facilitated by an inspection of these parts; for example, when any unusual difficulty is experienced in entering the mouth of the eustachian tube."—"Treatise on the Diseases of the Ear." St. John Roosa, p. 90. 1873. (See "Rhinoscopic.")

AURAL.

DIAGNOSTIC.

Otoscopes, Specula Auris. For Inspection of the External Meatus and Membrana Tympani.

FIG. 1996.
Gruber's Specula of Hard Rubber.

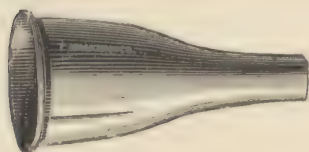


FIG. 1997.
Troeltsch's Ear Mirror.



FIG. 1998.
Wilde's Tubular Specula and Case.

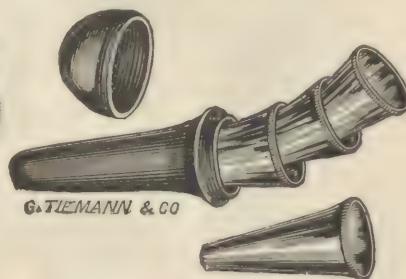


FIG. 1999.
Spir's Self-retaining Ear Speculum.

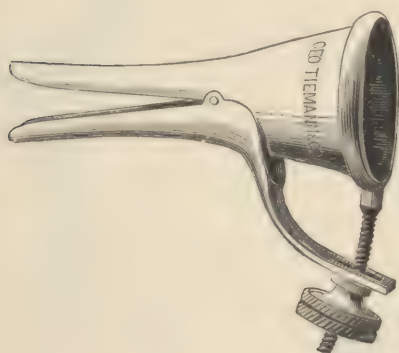
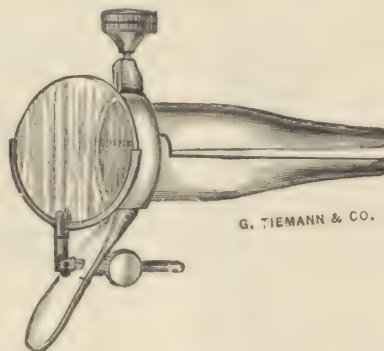


FIG. 2000.
Simrock's Otoscope, with Lens.



ROOSA'S, SCHROETTER'S,
TIEMANN & CO.'S
and other HEAD-RESTS,
see "LARYNGOSCOPES."

FIG. 2001.
Millikin's Self-retaining
Ear Speculum.



FIG. 2002.—Toynbee's Ear Specula,

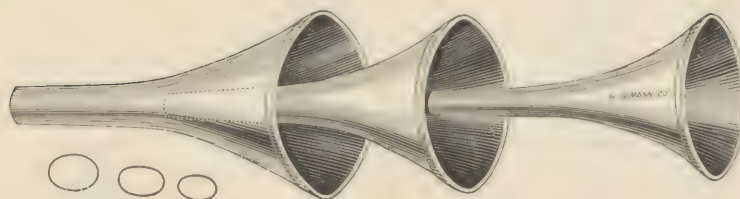


FIG. 2003.—Knapp's Ear Specula.

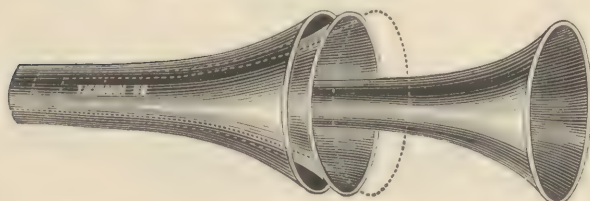
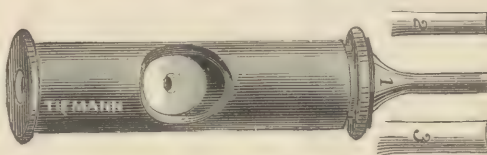


FIG. 2004.
Hassenstein's Otoscope, with Lens.



AURAL.

DIAGNOSTIC.

Otosopes, Specula Auris. For Inspection of the External Meatus and Membrana Tympani.

FIG. 2005.—Clarke's Otoscope, with Reflector and Lens.

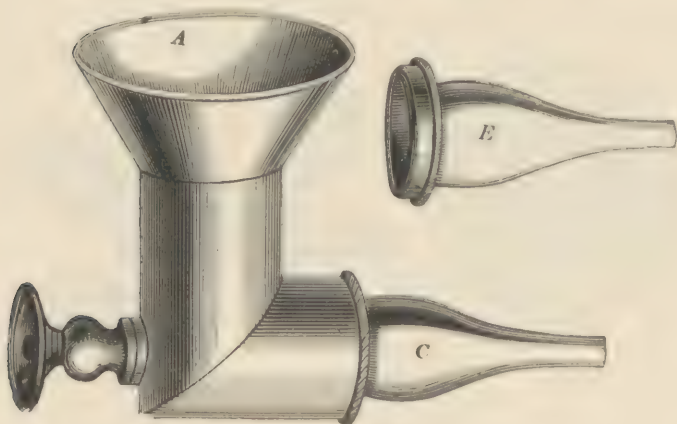


FIG. 2006.—Wilde's Gorgerec.



FIG. 2007.—Kramer's Ear Speculum.



FIG. 2008.—Brunton's Otoscope, with Lens and Reflector.

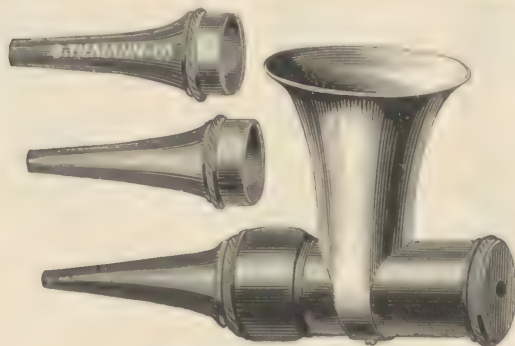


FIG. 2009.—Bivalve Ear Speculum.



FIG. 2010.—Speir's Ear Speculum.

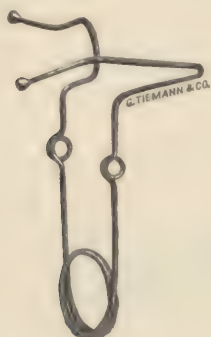
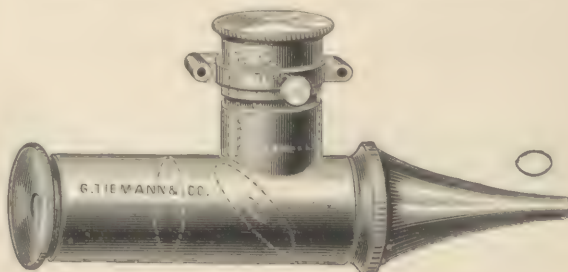


FIG. 2011.—Rumbold's Acou-Otoscope.



FIG. 2012.
Park's Electric Otoscope, with Lens and Reflector.



AURAL.

DIAGNOSTIC.

FIG. 2013.—Ear Probe, Steel, Angular.



FIG. 2014.—Buck's Silver Probe.

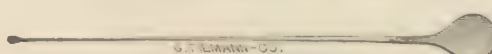


FIG. 2014 b.—Buck's Silver Probe.



FIG. 2015.—Toynbee's Diagnostic Tube.

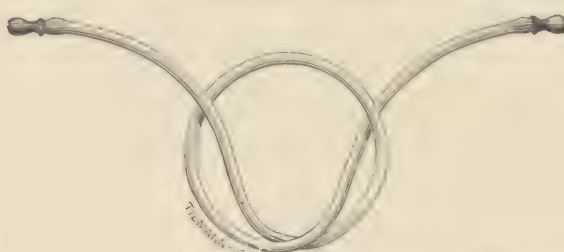


FIG. 2016.
Politzer's
Ear Manometer.



FIG. 2017.—Toynbee's Explorer.

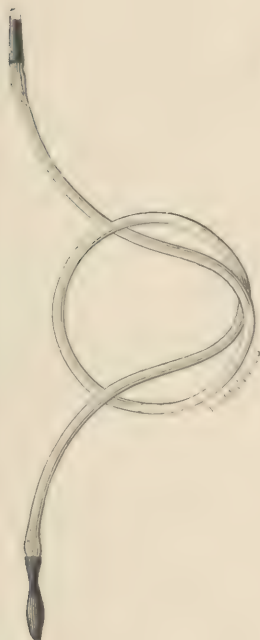


FIG. 2018.—Blake's Inner-Ear Mirror.

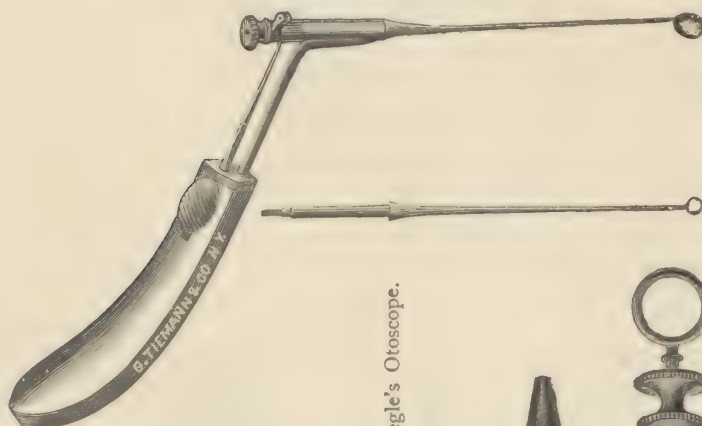


FIG. 2019.—Siegle's Otoscope.

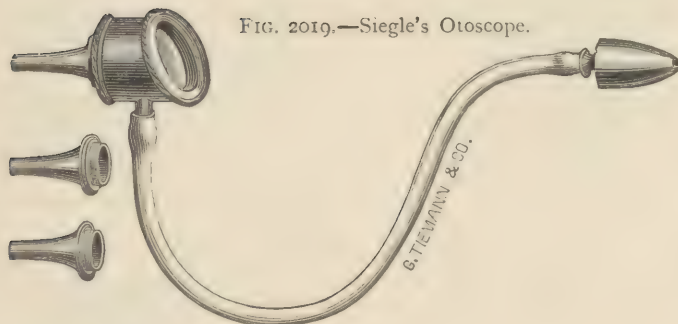
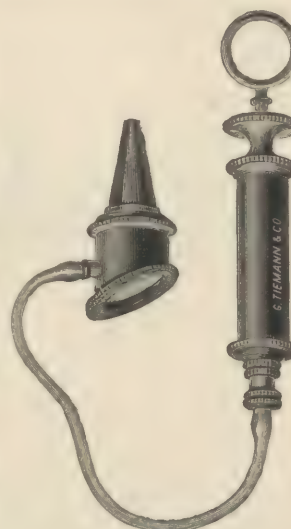


FIG. 2020.—Ely's Modification of Siegle's Otoscope.



Siegle's Otoscope enables us to form pretty accurate notions of the mobility of the membrane. The air is exhausted by means of the lips, while the membrane is carefully watched through the glass for its movements.

In Ely's modification of Siegle's Otoscope, the syringe is employed (instead of the lips for exhausting the air) by an assistant, while the surgeon examines the movements of the drum-head.

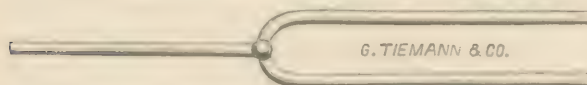
AURAL. DIAGNOSTIC.

FIG. 2021.—Politzer's Acoumeter, for testing perception for bone conduction.



bone conduction was of little or no account. As another proof of the latter point, he has never found a patient who was benefitted more by the audiphone than by a trumpet.—*New York Medical Journal*, January, 1881.

FIG. 2022.—Politzer's Tuning Fork (Diapason) C.



which it is struck. As the predominance of the upper tone is confusing, the fork should not be struck too hard, so that the key note, C, may be distinctly heard.

Bone Conduction.

"If the windows of the labyrinth were filled up with bone, then the ear, according to Knapp, would be in the condition of an eye with a closed pupil; the sound waves would be irregularly transmitted to the cochlea, not producing the sensation of a sound image, but an indefinite, quantitative perception of sound. Knapp thinks direct bone conduction does exist, but it produces only quantitative perception of sound, not useful hearing. He has never met with a patient who could hear his watch (H. D. = 24") from the mastoid process, temple, or other parts, if he could not hear it when applied to the ear. He has had patients with acute and chronic disease of the middle ear that could not hear his watch at all, or only when applied to the auricle; but when he had punctured the drum-head and inflated the ear by Politzer's method, his watch was distinctly heard, not only when applied to the auricle, but also from the mastoid or temple. This he regarded as conclusive that the immediate

The pitch of the tuning fork used by Politzer is C, vibrating 512 times in the second. On striking it we notice two distinct tones, one the key-note, C, the other the musical fifth, g. Either one or the other predominates, according to the force with which and the tensity of the substance against

The Tuning Fork in Diagnosis of Nervous Deafness.

"Certain tests can be applied to the hearing by means of a tuning fork placed on the head, which will sometimes give almost or quite decisive information. Little value can be attached to the mere fact that a tuning fork of any particular pitch is heard badly, or even not at all, through the cranial bones, since not only do various diseases of the tympanum produce this effect, but I have known at least one person, with healthy ears and perfect hearing for the voice, entirely unable to hear a tuning fork upon the head. But since this peculiarity is rare, an inability to hear vibrations thus imparted to the cranial bones may be fairly held as a suspicious circumstance, and at least the converse may be held valid that, if the tuning fork be well heard, the deafness is not likely to be nervous. But the chief use of the tuning fork in diagnosis rests on the simple fact that its vibrations, when imparted to the bones, *pass outward* freely through the tympanum and external meatus, and are therefore reinforced by reflection when either the tympanum or the meatus is rendered impervious to sound. If the meatus of a healthy ear be closed by the finger, the sound of a tuning fork placed on the head becomes louder, and the same is the case with sounds produced by our own vocal organs when the mouth is closed—the escaping vibrations being thrown back upon the labyrinth.

"If the meatus be obstructed by wax, the ear being otherwise healthy, the effect is the same; or, again, if the passage of vibrations through the tympanum be hindered by closure of the Eustachian tube. It may, indeed, be laid down as fairly ascertained that whatever diminishes the permeability of the tympanum or meatus for sonorous vibrations, causes the bone-conducted sounds to be, *ceteris paribus*, better heard. If, therefore, a patient comes to us deaf on one side only, we have at hand an immediate means of determining, with an extreme degree of probability, the seat of the disease. We place a tuning fork upon his head, and inquire on which side it is best heard, of course being careful not to accept a hasty answer. Generally it will be found loudest on the deafer side, the conducting media being most often in fault. If it is heard best, or only, by the better ear, the nervous system is in some way concerned in the deafness.

"It often happens, however, that no decisive information can be obtained in this way, the tuning fork not being heard unequally on the two sides, although the condition of the ears may be very different. This may be accounted for in many ways, such as inaptness of the patient to discern, or a balancing of morbid conditions producing opposite effects in the ear itself.

"Of course, when both ears are pretty equally involved, this method is not applicable. But in all cases the effect of closing the meatus by the finger, while the tuning fork is placed upon the head, gives important information. If the conducting media are healthy, the sound is rendered louder by the closure; if they are impermeable to vibrations, no effect is produced."—"Hinton, Surgeon-Aurist, Guy's Hospital Reports," Third Series, Vol. XIII., 1868, and "Diseases of the Ear," Turnbull, 1872, p. 337.

AURAL.

MICROCOUSTIC.

Ear trumpets are intended to aid the hearing of persons partially deaf, although sometimes used by ordinary persons to intensify distant sounds. We have no means of ascertaining at what period or by whom ear trumpets were invented. The practice of putting the hand to the ear in a trumpet shape probably first suggested it, and from occasional allusions to the use of the trumpet in old writers it would seem to have been of very early origin. The earliest form of which we have any knowledge was a rude imitation, on an exaggerated scale, of the form of the external ear; but as this was found inconvenient from the difficulty of retaining it in place, a form more nearly resembling a speaking trumpet was substituted. This was modified by bending the tube and applying the mouth, turned forward and given an elliptical form, close against the ear. Another modification was a flat tube passing over the head and applied to each ear, while in front immediately over the forehead was an opening to receive the sound.

One inventor, having observed that in listening intently people opened their mouths, contrived a sort of plectrum or vibrating body to be held between the teeth, and thus to convey sounds by the eustachian tube. After the introduction of caoutchouc and gutta percha into the arts, a long tube of one or the other of these materials, with a bell-shaped trumpet at the end, took a place along with the metallic trumpet, and for many purposes is very convenient. In England, in some of the churches, pews are constructed with tubes to conduct the sound, opening in convenient positions for the ear of the listener. Among the most recent inventions for facilitating hearing are the auricles and small tubes of silver with semi-globular expansions, intended to be inserted into the meatus of the ear; and the tympanum, a small thin disk of rubber, having a silver wire passing through it, to transmit the sound. In a few cases the latter has been of considerable service. In total deafness, such means are of no advantage.—“American Cyclopædia.”

Ear trumpets are to the ears what spectacles are to the eyes, but the aid which they render is neither as perfect nor as complete. Yet with all their defects they could not be dispensed with, as they are the *only means* by which partially deaf persons have intercourse with their friends, or are enabled to listen to a lecture or sermon. Each individual generally has his or her favorite instrument, and would not part with it on any consideration.

“Ear trumpets are bent, so as to cause the sound to be deflected from a straight line in passing into the ear, and by making the portion which receives the sound like a funnel, a much larger volume is received for the impression on the impaired auditory nerve. We must have a variety of these useful instruments, so as to allow the patient to choose the most suitable.”—Turnbull, “Diseases of the Ear.” 1872.

Ear Trumpets.

FIG. 2023.
Toynbee's Artificial Tympanum.



FIG. 2025.
Apparitor Auris.

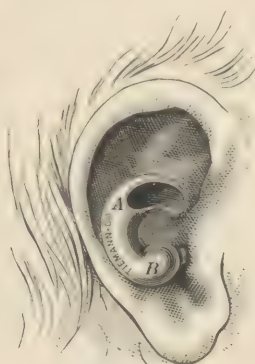


FIG. 2026.—Auricles.
Adapted to be worn on the head.

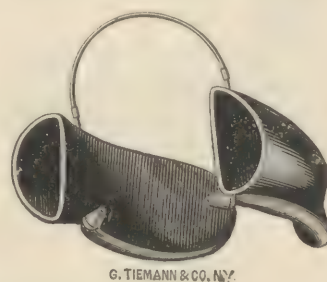


FIG. 2024.—Compact Ear Trumpet.

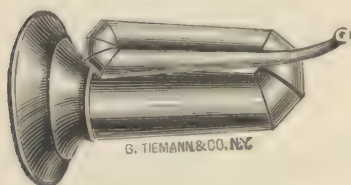


FIG. 2027.—German Silver Ear Trumpet.

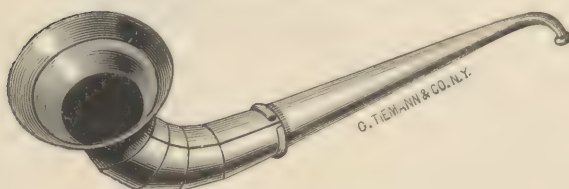
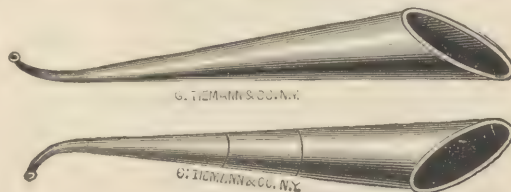


FIG. 2028.—Japanned Conical Ear Trumpet.



AURAL. MICROCOUSTIC.

Ear Trumpets.

The Martineau Hearing Horn, or Dipper Trumpet (Figs. 2029 and 2030) (paraboloid), is a powerful instrument, suitable to hear public lectures or sermons, and is often efficient where the smaller-sized trumpets fail.

FIG. 2029.—Dipper Trumpet

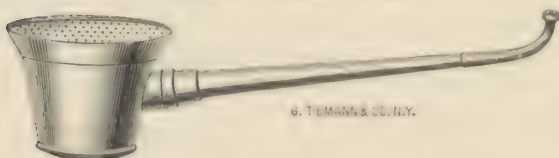


FIG. 2030.—Martineau Hearing Horn.



FIG. 2031.—Ear of Dionisius (Paraboloid).



FIG. 2033.—Long Japanned Ear Trumpet.



FIG. 2032.
London Hearing Horn.
(Paraboloid.)



FIG. 2034.—Corrugated Ear Trumpet

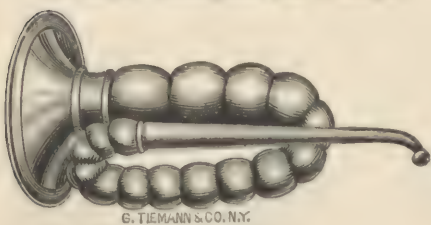


FIG. 2035.—Telescopic Ear Trumpet.

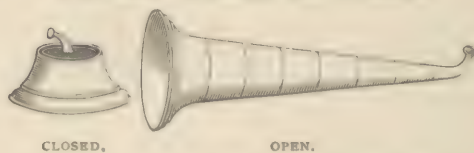


FIG. 2037.—Dome Trumpet.
(Paraboloid.)

FIG. 2036.—Conversation Tube, to make whispers audible.



FIG. 2038.—Walking Cane Trumpets.

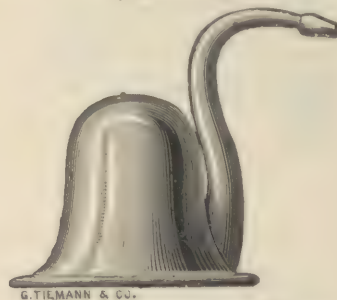
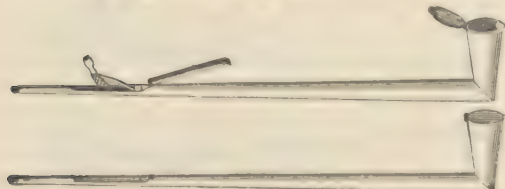


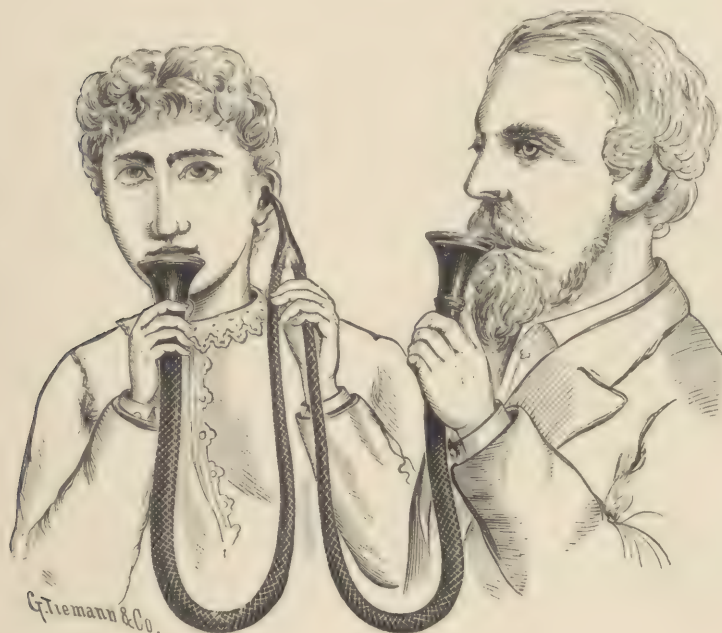
FIG. 2039.—Silver Cornets.



AURAL. MICROCOUSTIC.

Ear Trumpets.

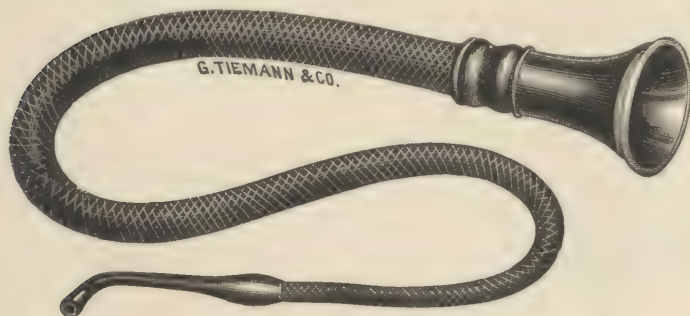
FIG. 2040.—Currier's Duplex Conversation Tube, for Educating Deaf Mutes.



Currier's Duplex Ear-Piece, in conjunction with the Conical Conversation Tubes, has been found to possess the greatest practical value of all the "aids to hearing" in the instruction of the deaf. The instrument, as shown in the picture, is the result of a series of experiments made by Prof. E. H. Currier, in the direction of developing speech and hearing in a class of partially deaf, and consequently mute children, in one of the largest institutions for the instruction of the deaf and dumb in America. It is not sufficient for the pupil to hear what is said to him, he must also hear himself say the same thing. In class-room instruction, after adjusting the instrument, the teacher first speaks through one of the tubes, and requires the pupil to repeat the words or sounds that have been uttered to him through the other tube. This enables him to compare his own enunciation with that of his instructor, and, after repeated trials, to obtain such control

over his vocal organs as to secure the reproduction with clearness and precision. Without *this aid*, a deaf person is wholly dependent upon the ear of his teacher, of whom he is obliged to inquire as to whether he has spoken correctly or not. But with *it*, he can depend, to a great extent, upon his own ear, only asking that the words shall be repeated a sufficient number of times to enable him to make the necessary comparisons. By means of such an education of the ear and of the voice, the partially deaf will be able to take their place in the society of the hearing, and also to converse with all who may address them through the mouth-piece of the tube.

FIG. 2041.—Currier's Large Conical Conversation Tube.



Currier's Conico-Cylindrical Conversation Tube was designed to extend the benefits of hearing to a large class whose deafness is so great as to render of no avail the American Conical Conversation Tube.

It is the most powerful conductor of the human voice yet perfected. It enables the voice to penetrate a greater degree of deafness than any other instrument, and is, therefore, of incalculable value to such persons as may be found to possess even the lowest degree of hearing. The attention of all who are engaged in the work of ameliorating

the condition of the deaf is called to these new instruments, in the belief that they will be found, in the highest degree, useful in training the ear, when the power of hearing is not totally extinct, and in bringing its invaluable aid to assist in the development of the voice.

Also on hand:

All the varieties of AUDIPHONES and DENTIPHONES in the market.

AURAL.

Foreign Bodies in the External Meatus.

"It would be difficult to enumerate the foreign bodies which might accidentally obstruct the auditory canal. They may be divided into two classes: 1st. Bodies forming in the ear itself, wax more or less hardened, pus, coagulated blood, &c.; 2d. Bodies introduced from without.

"The extraction of these foreign bodies may be effected either with scoops or forceps, whose curves and dimensions are appropriate to the direction of the external auditory canal. The forms of these bodies, their solidity, softness, &c., will furnish indications to the surgeon, which will direct him in the choice of the proper method of operating for their removal. By drawing with the left hand the pinna of the ear upwards and outwards, we straighten a little the curves of the canal and thus facilitate the introduction of instruments. By lubricating the canal with oil, the expulsion of the foreign body is more easily effected. It must be remembered, as an anatomical fact, that in adults the vertical diameter of the canal is greater than its transverse diameter. Instruments, therefore, should be carried along the inferior wall of the canal, in order that they may be insinuated more easily between it and the foreign body. In infants, on the contrary, the transverse is greater than the vertical diameter. In the second place, the membrana tympani, being inclined from above downwards and from without inwards, this arrangement should be recollected that the membrane may not be wounded, nor the foreign body be forced into the angle which is formed at the internal extremity of the canal.

"Hardened wax and analogous substances may be softened and removed by the use of injections of warm water. Surgeons have also successfully used forcible injections for the expulsion of solid bodies, which the reflux of the liquid force outwards. If all these means fail, we may have recourse to the method of *Paul*, of Egina, who advises the surgeon to make a small incision behind the pinna, on a level with the canal, through which a probe can be introduced behind the foreign body and used to force it from within outwards."

Polypi of the Auditory Canal

"May be removed, or destroyed in situ, by ligature, excision, avulsion, and cauterization. The ligature may be applied directly, or with the aid of knot-tyers or snares. Avulsion of the polypus is effected with steel forceps.

"The blood, which frequently flows in abundance after the operation, can be stopped by cauterization.

"The action of the caustic should be carefully watched, and it would be prudent to introduce a small wad of cotton into the auditory canal to preserve the membrana tympani."—"Bernhard and Huette's Operative Surgery." Van Buren and Isaac's Am. Ed., p. 168. 1857.

For the Removal of Foreign Bodies and Polypi.

The whole series of forceps, from the crude instruments of the earliest surgeons to those of the present day, are manifestly unfit for securing a firm grip on a foreign body which presents but a small part of its surface, and that a convex one, to their grasp. To this remark I make the one exception of the Tiemann bullet forceps, so successfully used in the late War of the Rebellion, and its smaller form, which finds a place in some of the pocket cases of the present day (Fig. 2057). In this instrument the teeth are set in such a manner that, even when only a small part of the foreign body can be reached, they can be firmly engaged in it and a considerable extractive force can be employed. It will be remembered that a trifle more space is obtained and the ease of extraction increased in the case of a tightly fitting body, if the patient is caused to open his mouth during the process, an experiment which any one can try by putting his little finger in his ear.—F. H. BROWN, M. D., in *American Journal of Otology*, January, 1881.

Quire's Nasal and Ear Curette (Fig. 2051, page 191) is introduced with short bar straight, and, after its introduction beyond the foreign body to be removed, the short bar is brought to the angle required by the action of the index finger and thumb on the spring.—*Medical and Surgical Reporter*, July 3, 1880.

FIG. 2042.—Bosworth's Snare Ecraseur, for Aural and Nasal Polypi.



The principle involved in the *ecraseur* is that the pedicle is embraced and severed by *ecrasement*. In this procedure the whole growth is removed, and, at the same time, some of the connective tissue fibres are drawn out from the mucous membrane: thus no polyp tissue remains from which a new growth may develop. The in-

strument shown is a combination of the *ecraseur* principle with that of the snare: a modification of Jarvis' and Wilde's instruments, in which the manipulation of the loop is entirely under ocular inspection during the operation.—*Medical News*. February 24, 1883.

See SNARE-ECRASEURS for Nasal and Pharyngeal Polypi.

AURAL.

For the Removal of Foreign Bodies, Flakes of Epidermis, Wax, Hair and Fluid Secretions, and for Dressing.

FIG. 2043.—Speir's Ear Curette.

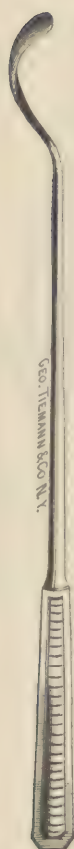


FIG. 2043.—McKay's Ear Forceps.



FIG. 2044.—Buck's Ear Curette.



FIG. 2045.—Poltzer's Hard Rubber Ear Spoon.



FIG. 2046.—Gross' Ear Spoon and Hook.



FIG. 2047.—Elsberg's Angular Screw-Hook.

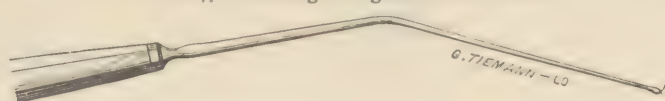


FIG. 2050.—Angular Ear Hook.

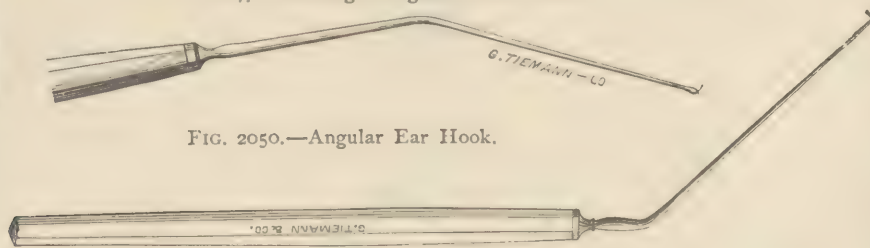


FIG. 2051.—Quire's Nasal and Ear Curette.

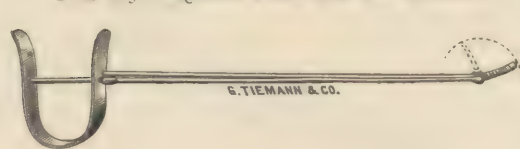


FIG. 2052.—Poltzer's Cotton-wool Forceps.

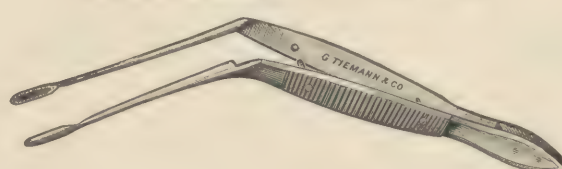


FIG. 2054.—Sexton's Ear Dressing Forceps.

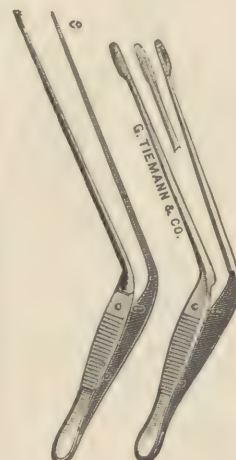


FIG. 2049.—Fenestrated Ear Scoop.

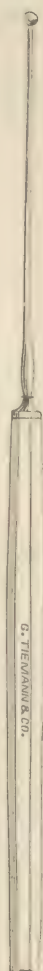


FIG. 2053.—Devil's Screw-Hooks.



AURAL.

For the Removal of Foreign Bodies and Polypi.

FIG. 2055.
Pomerooy's Ear Forceps.

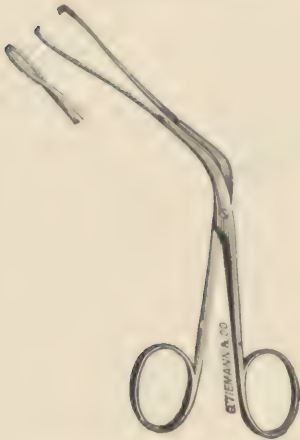


FIG. 2056.—Avery's Ear Forceps.

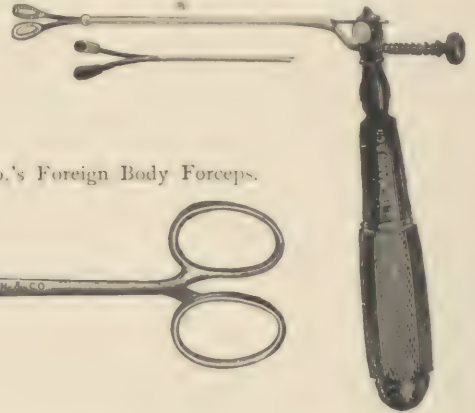


FIG. 2057.—Tiemann & Co.'s Foreign Body Forceps.



FIG. 2058.—Tiemann & Co.'s Ear Forceps and Reflector.

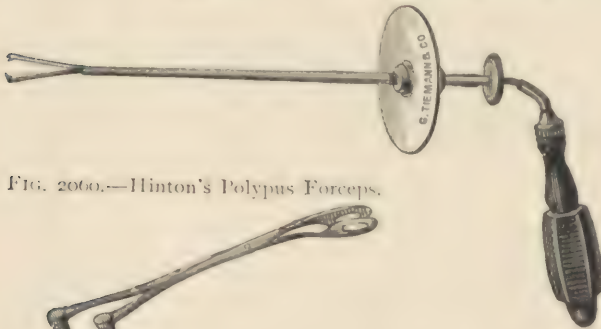


FIG. 2059.—Poltzer's Polypus Forceps.

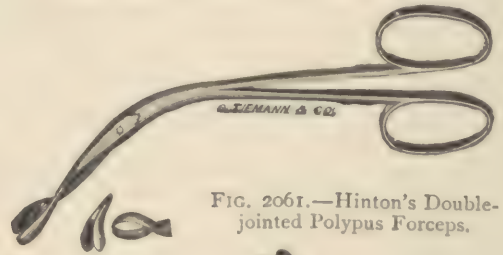


FIG. 2060.—Hinton's Polypus Forceps.

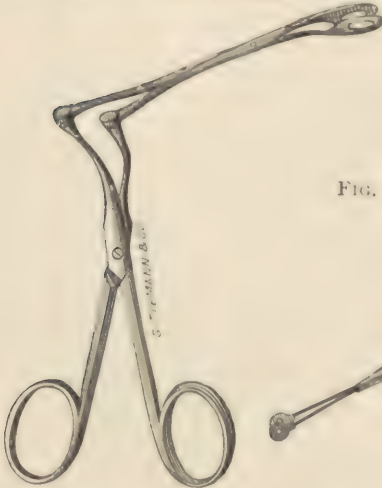


FIG. 2061.—Hinton's Double-jointed Polypus Forceps.



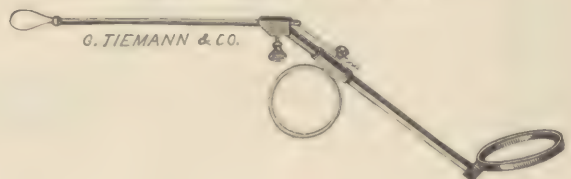
FIG. 2062.—Bumstead's Canulated Forceps.



FIG. 2063.—Wilde's Polypus Snare.



FIG. 2064.—Blake's Polypus Snare.



AURAL.

For the Removal of Foreign Bodies, Polypi, &c.

FIG. 2065.—Tiemann & Co.'s Universal Ear Forceps.

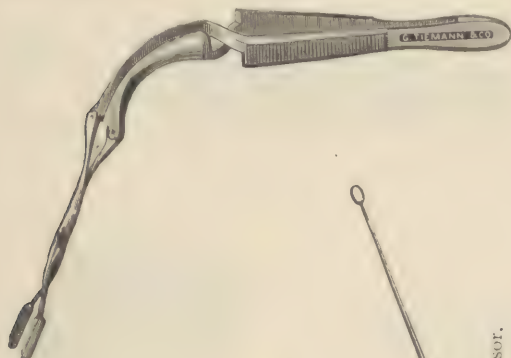


FIG. 2066.—Allen's Polypus Forceps, and for Removing Solid Bodies.

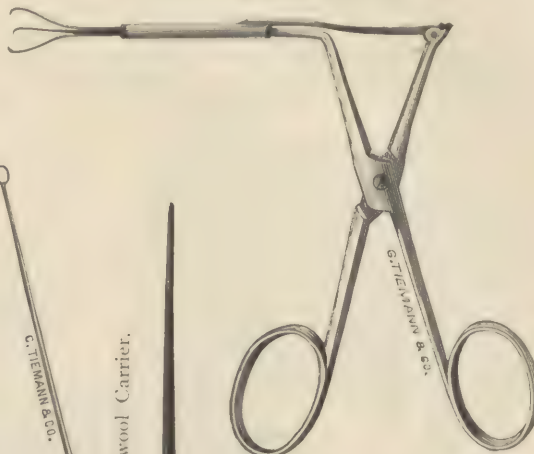


FIG. 2067.—Bacon's Blunt Curette Ear Forceps.

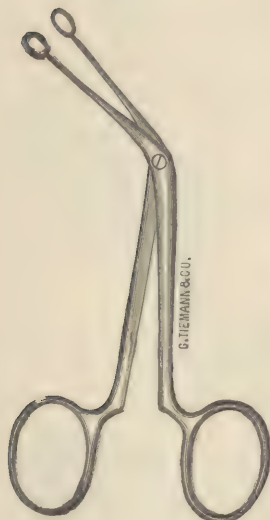


FIG. 2068.—Sexton's Double Curette.

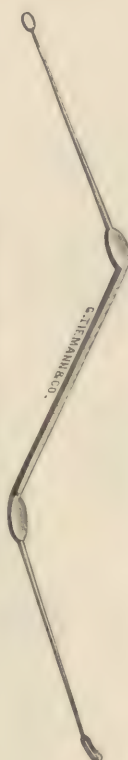


FIG. 2069.—Sexton's Folding Tongue-Depressor.



FIG. 2070.—Vulcanite Cotton-wool Carrier.



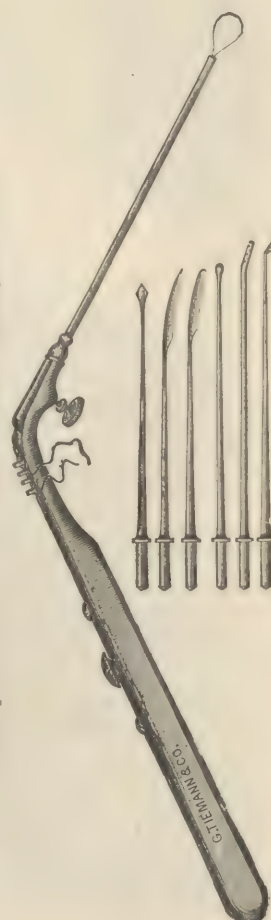
FIG. 2071.—Sexton's Foreign Body Forceps.



FIG. 2072.—Noyes' Ear Forceps.



FIG. 2073.—Sexton's Handle, with Polypus Snare, Myringotome, Sharp-pointed Knife, Probe-silver Probe, Hoe-shaped Scraper.



AURAL.

DOUCHES AND SYRINGES.

For Removing Foreign Bodies and Cleansing the Ear after Operations, and in Chronic Suppurations of the Middle Ear, and for Alleviating Pain.

FIG. 2074.—Lucae's Reflux Ear Douche.

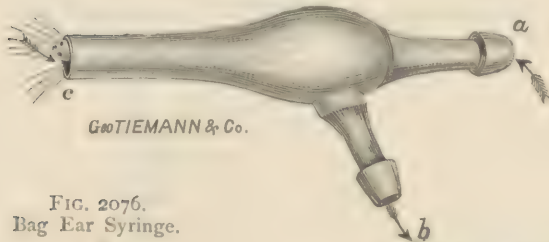


FIG. 2075.—Hard Rubber Ear Syringe.



See "CLARK'S DOUCHE."

FIG. 2078.—Soft Rubber Ear Syringe.

FIG. 2076.
Bag Ear Syringe.

FIG. 2077.—Kramer's Ear Syringe.



FIG. 2079.—Sexton's Ear Douche.

FIG. 2080.
Buck's Ear Nozzle.

FIG. 2081.—A. H. Smith's Ear Syringe.

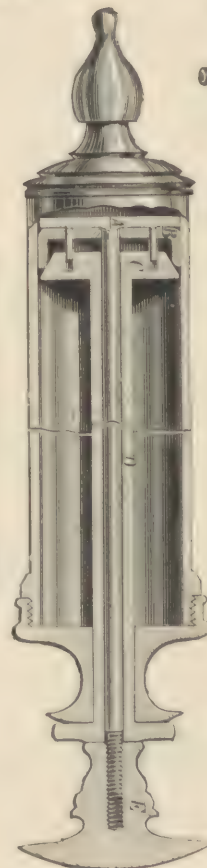
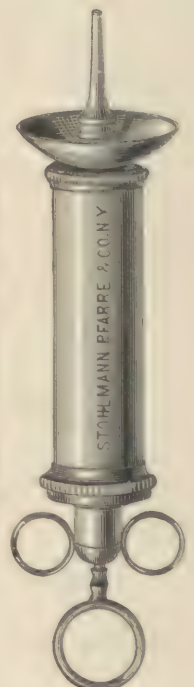


FIG. 2082.—Pomeroy's Ear Syringe.



AURAL.

DOUCHES, PUS BASINS AND SPOUTS.

"The warm douche is very valuable in the treatment of chronic eczema of the canal. It allays itching sensations, and is usually very grateful to the patient. The use of the douche may be entrusted to the patient himself. It is well to use it very often in the early periods of treatment—say once an hour. The warm water is a direct antiphlogistic; I have seen its use alone cure most obstinate cases of inflammations of the canal that have existed for years."—"Treatise on Diseases of the Ear." St. John Roosa, p. 118. 1873.

FIG. 2083.—Ear Spout and Hose.



FIG. 2084.—Hosner's Ear Spout.



FIG. 2085.
Up de Graff's Ear Basin.

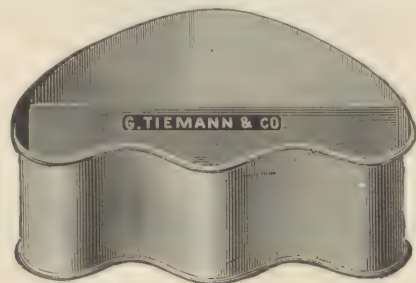
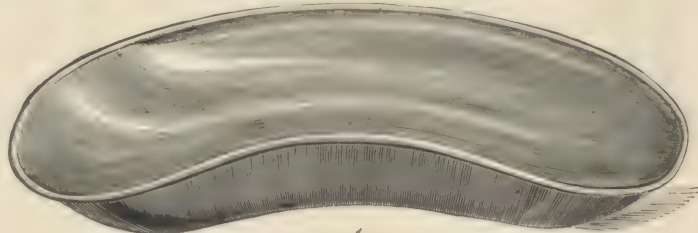


FIG. 2086.—Donder's Ear Spout.



FIG. 2087.—Eiterbecken (Pus Basin), Brass.



G. TIEMANN & CO.

FIG. 2089.—Triangular Pus Basin.



FIG. 2088.—Pus Basin, Hard Rubber or Tin.



G. TIEMANN & CO.

FIG. 2090.—Elastic Caustic-Holder, for the Application of Powders and Caustics.

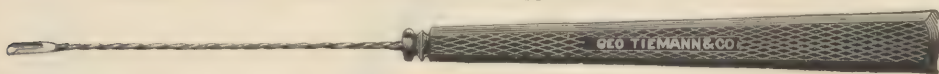


FIG. 2091.—Buck's Cotton Probe.



FIG. 2093.—Buck's Port Acid Glass.

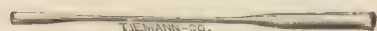


FIG. 2092.—Sexton's Powder-Blower.



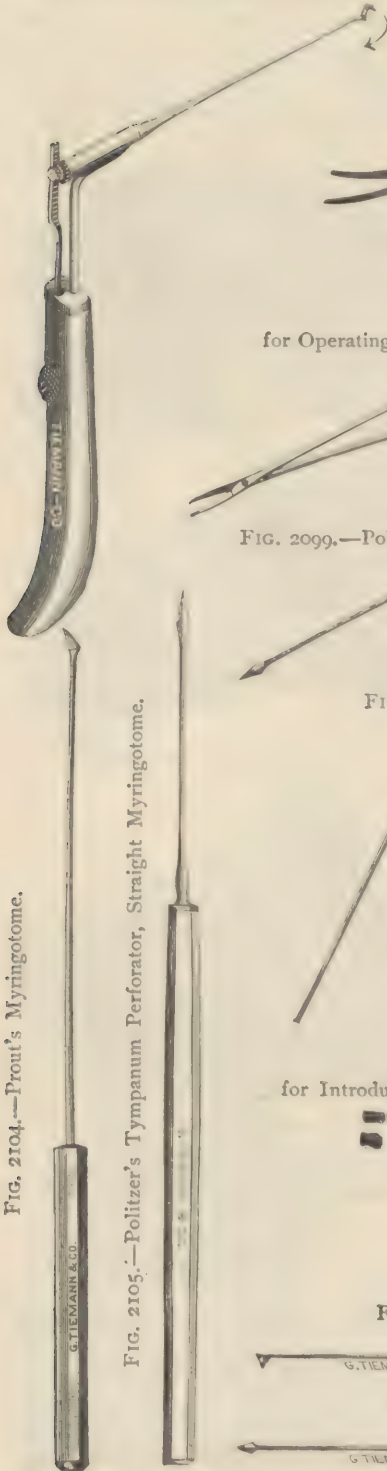
FIG. 2094.—Knapp's Powder-Blower.



AURAL.

FOR THE MEMBRANA TYMPANI AND THE INNER EAR.

FIG. 2095.
Weber's Tensor Tympani Instrument.



Bistouries, Myringotomes,
Furuncle Knives,
Scissors for the Ossicula
Auditus.

FIG. 2097.—Gruber's Scissors.



FIG. 2096.
Gruber's Tensor Tympani Instrument.



FIG. 2098.—Simrock's Scissors,
for Operating on the Tympanum and Small Bones of the Ear.



FIG. 2099.—Poltzer's Tympanum Perforator, Angular Myringotome.



FIG. 2100.—Blake's Inner Ear Syringe.



FIG. 2101.—Poltzer's Forceps,
for Introducing Eyelets into the Perforated Tympanum.



FIG. 2102.—Buck's Furuncle Knife.

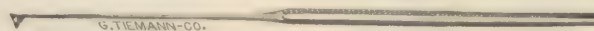


FIG. 2103.—Buck's Myringotome.



FIG. 2104.—Prout's Myringotome.

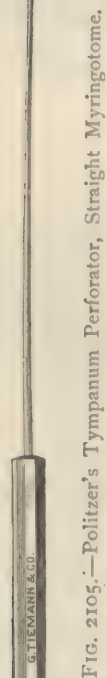


FIG. 2105.—Poltzer's Tympanum Perforator, Straight Myringotome.

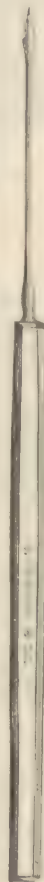


FIG. 2106.—Buck's Sharp-Pointed Bistoury.

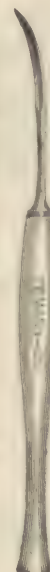


FIG. 2107.—Buck's Probe-Pointed Bistoury.



AURAL.

FOR PERFORATING THE MASTOID PROCESS AND THE REMOVAL OF NECROSSED BONE.

FIG. 2108.—Buck's Mastoid Process Knife.



FIG. 2109.—Burnett's Knife, for Mastoid Process.



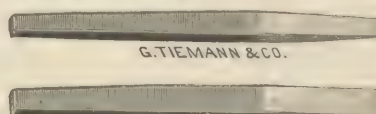
FIG. 2111.—Hand Gouge.



FIG. 2110.—Buck's Periosteotome.



FIGS. 2112 and 2113.—Buck's Chisels.



Schwarze's Chisels and Gouges.

2114 2115 2116 2117 2118 2119 2120 2121 2122



FIG. 2123.—Post's Rongeur, for Removing Necrosed Bone.



FIG. 2124, 2125.—Knapp's Mastoid Drainage Tubes.



FIG. 2126.—Gruening's Mastoid Drainage Tube.



FIG. 2127.—Buck's Drills.

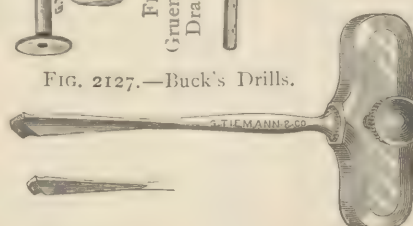


FIG. 2128.—Poltizer's Mastoid Knife.

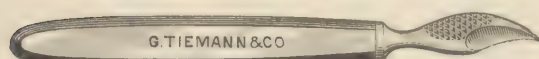
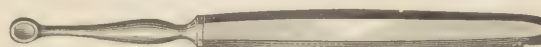


FIG. 2129.—Poltizer's Mastoid Scoop.



See "MALLETS," pp. 102-113.

Perforation of the Mastoid.

The conditions under which the mastoid may be properly operated upon, either in periostitis or caries, may be formulated as follows:

1. The integument and periosteum should be freely divided over the mastoid in all cases in which there is pain, tenderness and swelling in the part.—Wilde.
2. Such an incision should also be made whenever severe pain, referred to the middle ear, exists, and is not relieved by the usual means, *i. e.* leeches, warm water, &c.
3. An explorative incision should be made when we have good reason to suspect the existence of caries and retained pus in this part.
4. The mastoid bone should be perforated after such an incision whenever the bone is found diseased, or a small fistulous opening should be enlarged. It should also be perforated when we have good reason to believe that there is pus in the middle ear or mastoid cells which cannot find an exit by the external auditory canal.

AURAL.

Perforation of the Mastoid. (Continued.)

5. The mastoid should be perforated in the case of a suppuration of long standing, with frequent and painful exacerbations.

The operation may now be sure to be fairly established, and is frequently undertaken, it having been performed by Follin, Schwartze, Pagenstecher, Hinton (London), Jacoby, Agnew (New York), Colles (Dublin), and by myself since 1859.—Dr. St. John Roosa.

Dr. A. H. Buck has appended to his articles on mastoid disease (from which I have quoted), a table containing thirty-four cases of opening of the mastoid, beginning with Arneman. Drs. Weir, Laight and Buck of this city, Drs. Newton, of Brooklyn, and North, of Waterbury, Conn., are among the surgeons who have operated since 1870, and this second surgical procedure may be said to be fairly established in the profession. Twenty-six cases reported by Buck resulted in recovery.—“Treatise on the Diseases of the Ear.” St. John Roosa, M. D., p. 424. 1873.

Peroxide of Hydrogen in Mastoid Abscess.

Dr. Prince, having learned of the peculiar property of peroxide of hydrogen, as applied by dentists, that upon coming into contact with the pus in the foetid cavity of a tooth, the liberated gas permeates it throughout, and by the continued evolution of the gas the cavity is emptied of its contents, which boil out at the fistulous opening so thoroughly mixed that the appearance is that of foam or froth; while the remnant not thus removed is rendered so thoroughly antiseptic that the healing process proceeds uninterruptedly, he was led to apply it in mastoid abscess, and reports a case in the *St. Louis Medical and Surgical Journal*, March, 1884:

“Julia, eight months old. Suppuration following scarlatina had existed about ten weeks, when the mastoid became invaded and continued to grow worse, until it assumed a serious aspect with marked symptoms of septic poison. When it came under observation the child had become much emaciated with continued fever and loss of appetite. Examination revealed absence of the drum membrane, exceedingly offensive pus, granulations in the tympanic cavity, with swelling, redness and heat over the mastoid. These symptoms established the presumption, if not the certainty, that the disturbance was caused by a quantity of confined and foetid pus, somewhere among the mastoid cells. Acting on this conception of the case, a drill was passed through the mastoid directly into the tympanic cavity. A fenestrated cataract spoon was then placed into the drum cavity, with the opening in the line of the direction of the drill, which was then withdrawn, and a flexible lead wire passed along its track until the end reached the fenestrum of the spoon, by the removal of which its extremity was directed into the meatus. By the aid of the angular forceps it was then drawn out and turned down on the cheek. It was now possible, through the cutaneous opening in the mastoid, to inject antiseptic solutions which escaped from the external meatus. This usually successful manoeuvre failed. The capacity of my hypodermic syringe was injected by the side of the lead wire, the finger of the remaining hand being held over the external meatus. Upon withdrawing the syringe, and preventing the escape of the liquid, the liberated oxygen must have penetrated every accessible recess of the mastoid cells, with the same force that caused it to boil out of the external openings, baffling all efforts to restrain it. The conduct of the agent was in every respect satisfactory, and the quantity of pus dislodged by this tumultuous effervescence proved it to have reached the seat of trouble, and the intimate mixture of gas and pus, which appeared as a yellow froth at the points of escape, reminds us of its behavior under the microscope, where it is seen that no cell escapes its disturbing action. By repeated injections, so long as any pus remains, the oxygen will continue to be liberated; hence, by the absence of the evolution of gas, an evidence exists that the cavity is completely empty and the surface freed from the presence of pus.

Eustachian Catheters.

From the date of the promulgation of the use of the eustachian catheter by the postmaster of Versailles, *Guyot*, until Toynbee's time, the views of the profession as regards the use of this instrument have varied exceedingly. At one time it was almost utterly rejected by the greater number of respectable practitioners, and at another time has been considered by them as a panacea in the treatment of aural disease. The text-books of Wilde and Toynbee, which attached very little importance to the use of the eustachian catheter, and which bear intrinsic evidence that the authors did not choose to be very familiar with the details of the proper employment of the instrument, probably did more than anything else to cause the profession in our own country to settle down, until a few years since, into the belief that the eustachian catheter was always a useless and sometimes a dangerous instrument. * * * In regard to the change in sentiment I only need to say that nearly every American surgeon who now treats aural disease, attaches much importance to the use of this instrument.

The material of which the instrument should be made, may be either alloyed silver or hard rubber. For diagnosis the silver catheter is to be preferred. For the injection of warm vapors, the india-rubber instrument is the only one to be used, because the heat will very soon make it impossible for a patient to bear the metal instrument in the nostril.—“Treatise on the Diseases of the Ear.” St. John Roosa, p. 93. 1873.

AURAL.

FOR THE EUSTACHIAN CANAL.

FIG. 2130.—Eustachian Catheter, Hard Rubber or Silver.

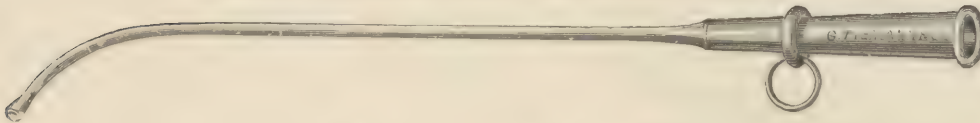


FIG. 2131.—Wire Nose Clamps, for Holding the Eustachian Catheter.



FIG. 2133.
Pomeroy's Kramer's
Eustachian Catheter Holder.

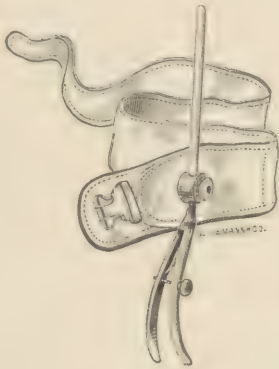


FIG. 2135.—Noyes' Eustachian Catheter.

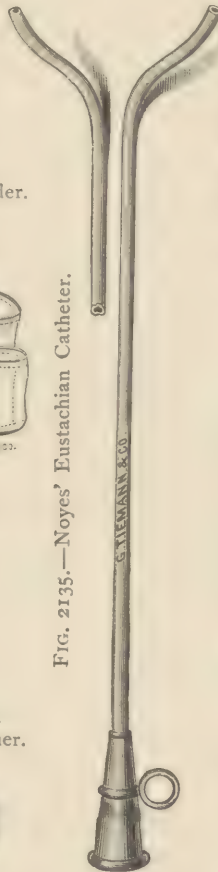
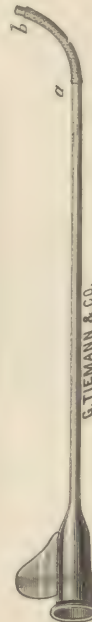


FIG. 2136.—Fitzgerald's Eustachian Catheter.



Point of spiral wire, covered with rubber.

FIG. 2137.—Woakes' Eustachian Catheter.

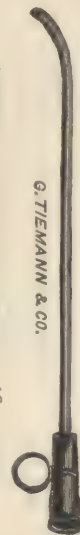


FIG. 2138.—Dr. Ferguson's Eustachian Catheter, soft rubber, velvet-eyed point, flat metal spiral inside.

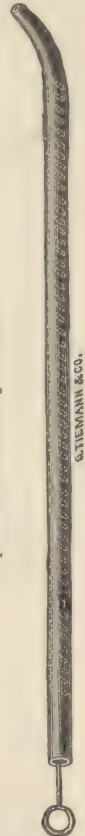


FIG. 2134.—Bonafont's
Eustachian Catheter Holder.



FIG. 2132.—Sexton's Eustachian Catheter.



"Dr. Noyes has modified the eustachian catheter by giving the beak a double curve of extra length. The cut exhibits the manner in which the second curve is made to point exactly in the direction of the eustachian tube. When introducing the catheter, it is needful to keep the front close to the septum, as well as to the floor of the nostril. Arrived at the posterior edge of the septum, the beak should wind closely around it, curving obliquely across, and turning upwards, so as to point towards the eustachian orifice."—"Transactions of the Otological Society." 1870.

Dr. Sexton's eustachian catheter is made partly of German silver, point of rubber, for painless introduction.—*Medical Record*, N. Y., July 16, 1881.

Auscultating the Middle Ear, by Catheterization of the Eustachian Tube.

"For this purpose the patient should be seated with his back and head firmly supported in the erect position. The operator places one end of the otoscope (Fig. 2015) in the external ear of the patient corresponding to the tube to be examined, the other end being similarly placed in his own ear. It will facilitate the accommodation of the instrument if its hard tips be covered with a short length of soft rubber tube, which enables them to be tolerated by the external meatus of each, without that annoyance which is apt to occur if this precaution be omitted.

"The surgeon takes the short silver eustachian catheter (Fig. 2137) between the forefinger and thumb of his right hand and introduces it into the nostril of the patient on the side that already supports the diagnostic tube. In doing

AURAL.

Auscultating the Middle Ear. (Continued.)

this, care must be taken to prevent the beak of the catheter striking against the margin of the nostril, or, beyond this, the contents of the nasal fossa; to aid this step, it may be convenient to tilt up the end of the nose with the forefinger of the operator's left hand. When the beak has thus freely passed the vestibule, it should be depressed until it is felt to rest on the floor of the nose; it is then passed onward, being held all the while so lightly that any check which may be encountered is appreciated by the operator before pressure has been applied to the obstruction and pain thereby elicited.

"When, by the cessation of the resistance afforded by contact with the nasal floor, the operator becomes aware that the instrument has entered the post-nasal space, he should give it a quarter turn *inward*, and gently withdraw it until the curve of the catheter touches the septum. The patient having all this time been directed to *breathe entirely through the nose* and to keep his mouth closely shut, the veil of the palate should not be encountered; the surgeon is now, therefore, free to make a firm but gentle turn of the instrument over half a circle *outward*, following the dependent surface of the palate as his guide, until the ring of the instrument corresponding to its curve lies horizontally outward and a little upward. If this proceeding has been successfully accomplished, the back of the catheter will be now resting in the orifice of the eustachian tube. * * * When the catheter is introduced in this manner the surgeon need not concern himself about the posterior wall of the pharynx, as his instrument does not approach it. * * *

"It is necessary to have some guide to the situation of the orifice of the eustachian tube, and this is afforded by the straight posterior border of the septum nasi (vomer), with which the curve of the catheter is brought into contact by means of the quarter turn *inward* given to it as it leaves the cavity of the nose. When the concluding step of the operation is accomplished by the half turn *outward*, the mouth of the tube will be entered by the catheter. This latter step cannot be executed at all unless the conditions of breathing above indicated be followed; for, if the patient breathe through his mouth, the veil of the palate will be drawn upward and fix the catheter as in a vice, at the same time causing much pain to the patient. The various details of the mode of catheterization above described have been contributed by several otologists, but especially by Loewenberg, of Paris."—"Post-Nasal Catarrh." Woakes.

An improved form of Eustachian Catheter. (Fig. 2138.)

In order to overcome the difficulty of passing an eustachian catheter in cases where the inferior turbinated bone or a displaced septum encroach on the nasal passage, and to avoid giving pain to the patient when the nasal mucous membrane is much swollen and sensitive, it occurred to me that a soft rubber catheter might be used, fitted with a straight style, on withdrawal of which the catheter would resume its curve. My idea has been very carefully carried out by Messrs. Tiemann, and the instrument has given very satisfactory results so far as I have yet been able to try it. The catheter is of the ordinary shape, and is of soft red rubber, having inside the stem, and extending nearly to the point, a spiral of fine wire, which prevents the lumen of the instrument being lessened by pressure when in position. There is a straight style of the same length as the catheter, which, when it is introduced, obliterates the curve at the beak. The catheter on the style is introduced like a straight probe along the floor of the nostril, with the side to which the beak tends to curve outward. When the back of the pharynx is felt, the style is withdrawn and the beak curls around to the mouth of the eustachian tube. In several cases I have not had to draw it forward at all, for the curve of the beak withdraws the point about the right distance. The instrument passes through very much obstructed nostrils and gives no pain in cases in which the hard rubber catheter cannot be tolerated.—H. LINDO FERGUSON, F. R. C. S. J., Dnedin, N. Z., *Archives of Otolary*, Vol XIII., Nos. 3 and 4.

Inflation of the Cavity of the Tympanum through the Eustachian Tube.

The purposes for which inflation is practised are: First, *diagnosis*; in order that the permeability of the tube may be determined; and in order that, by the diagnosis tube applied at the same time to the external ear, or by inspection with the reflector, the condition of the middle ear may be ascertained through the medium of the various aëres, and also the movements of the ossicula and of the tympanum.

Second, treatment; that is, for the purpose of removing secretions from the tube and middle ear, overcoming slight adhesions of the tube, and preparing the way for the introduction of medicated fluids, or vapors, &c.

Politzer, of Vienna, introduces the nozzle of a gum-elastic bag into the nares, and compressing the alæ with his thumb and fingers, directs the patient at the same moment to swallow. The act of deglutition lifts the velum palati, and opens the mouth of the eustachian tube, thus enabling the current of air, or of fluid, to pass more directly into the ear. In children, the orifice of the eustachian tube being much larger than in adults, it is not necessary to direct them to swallow while the air is being injected. Gruber has modified the practice of Politzer, by directing a current of water into one nostril, while the other is closed, and the head bent forwards; when, in the case of children, some of the fluid will generally find its way into the corresponding eustachian tube. In adults, it is recommended to close both nostrils and the mouth, and to direct the patient to make a moderate attempt to blow while the current is passing in.—"The Principles and Practice of Surgery." Hamilton, p. 590. 1872.

AURAL.

FOR THE EUSTACHIAN CANAL.

FIG. 2139.—Poltzer's Air-Bag, for Inflating the Eustachian Canal.

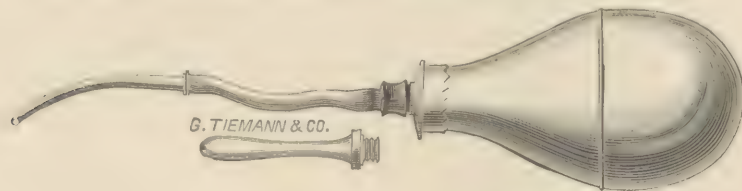
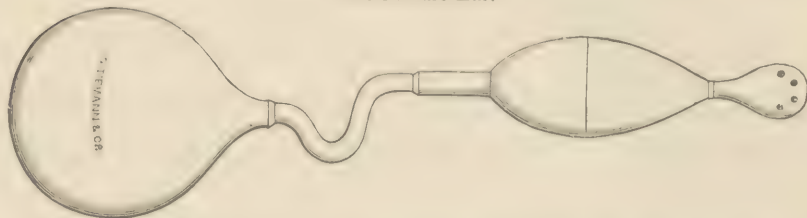


FIG. 2140.—Roosa's Attachment and Poltzer's Air-Bag, for Treating Diseases of the Middle Ear.



"The bulb contains a moist sponge, on which are placed a few drops of tincture of iodine. The combined apparatus is then used in the same manner as the ordinary air-bag, which constitutes Poltzer's apparatus."—St. John Roosa, M. D., "Tröltch on the Ear," p. 248. 1869.

FIG. 2143.—Hackley's Instrument for Spraying the Eustachian Canal.

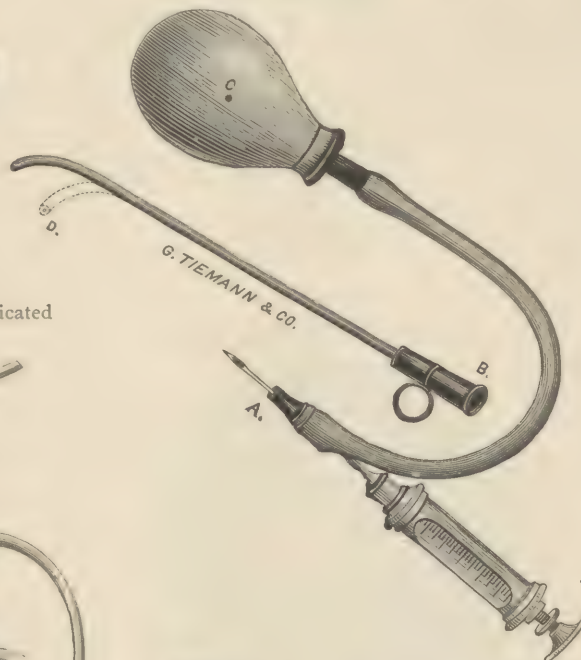


FIG. 2142.—Sexton's Insufflator.

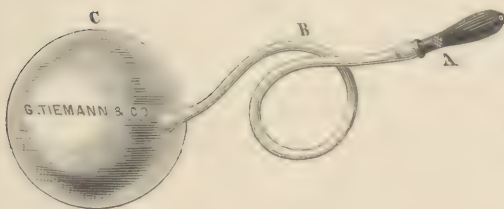


FIG. 2144.—Buttle's Inhaler, and for Forcing Medicated Vapors into the Eustachian Canal.

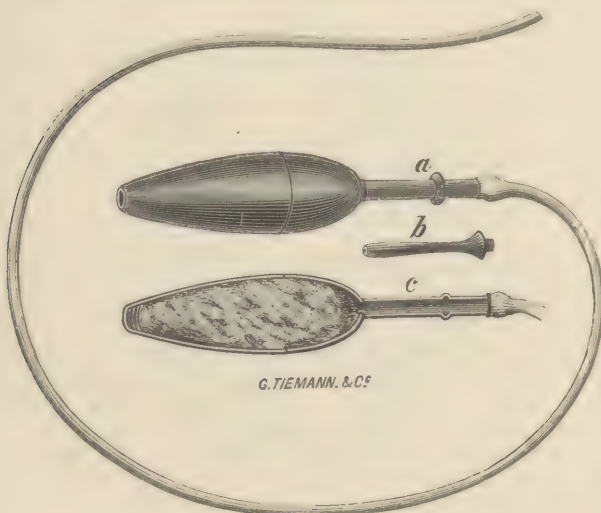
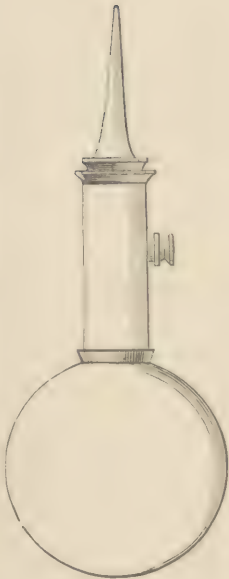


FIG. 2145.—Sexton's India-Rubber Nozzle for Poltzer's Air-Bag.



FIG. 2141.—Hardy's Chloroform Douche.



AURAL.

Roosa's Set of Ear Instruments.

\$43.40.

- 1 Troeltsch's Ear Mirror, with handle, and Roosa's Head-band.
- 1 set of three Wilde's Tubular Specula.
- 1 pair of Wilde's Angular Forceps.
- 1 Scalpel and David's Curette. 1 Cotton Probe.
- 1 Eustachian Catheter, silver.
- 1 Eustachian Catheter, hard rubber.
- 1 Posterior Nares Syringe, hard rubber.
- 1 Roosa's Iodine Apparatus.
- 6 Toynbee's Artificial Tympana.
- 1 Diagnostic Tube and Explorer.
- 1 Siegle's Pneumatic Otoscope. 1 Tuning Fork (C).
- 1 Small Powder-Blower, hard rubber.
- 1 Blake's Ear Snare and Paracentesis Needle.
- 1 Morocco-covered Case, lined with velvet. And,
- 1 Politzer's Apparatus, in a separate paper box, \$2.

Buck's Set of Ear Instruments.

\$35.

- 2 Curettes. 1 Mastoid Process Knife.
- 4 Cotton Holders. 1 Port Acid Glass.
- 1 Silver Probe. 1 Silver Probe.
- 1 Blunt-pointed Curved Bistoury.
- 2 Myringotomes. 1 Furuncle Knife.
- 1 Sharp-pointed Curved Bistoury.
- 2 Drills for Mastoid Process.
- 1 Mirror, 2½ inch diameter, and Head-Band.
- 1 Wild's Ear Forceps, very delicate.
- 1 Blake's Snare, silver canula, only one hole, to receive No. 37 wire doubled.
- 1 set of (4) Wild's Ear Specula, silver.
- 1 Fine Morocco Case, silk velvet lining.

Sexton's Set of Ear Instruments.

\$35.

- 1 Handle, into which are fitted :
 - 1 Polypus Snare. 1 Sharp-pointed Ear Knife.
 - 1 Myringotome. 1 Probe-pointed Ear Knife.
 - 1 Stout Silver Probe. 1 Hoe-shaped Scraper.
- 1 Foreign Body Forceps.
- 1 Small Dressing Forceps.
- 1 3 inch Head Mirror and Band.
- 1 set of German Silver Ear Specula.
- 1 Sexton's Folding Tongue Depressor.
- 1 Sexton's Double Curette.
- 1 Vulcanite Cotton-Wool Carrier.
- 1 Aluminium Cotton-Wool Carrier.
- 1 Silver Probe, 6½ inches long.
- 1 Scalpel and Tenotome, in slide-catch tortoise-shell handle.
- 1 Case, covered with morocco, lined with silk velvet.

Politzer's Set of Ear Instruments.

\$22.

- 1 Troeltsch's Mirror, with handle.
- 3 Hard Rubber Ear Specula.
- 1 Hard Rubber Curette. 1 Curette and Hook, steel.
- 1 Polypus Knife, steel. 1 pair of Angular Forceps.
- 1 Wilde's Polypus Snare. 1 Hard Rubber Syringe.
- 2 Hard Rubber Eustachian Catheters.
- 1 Diagnostic Tube and Explorer.
- 1 Morocco-covered Case, lined with velvet.

Toynbee's Set of Ear Instruments.

\$23.20.

- 3 Silver Ear Specula (Toynbee's).
- 1 pair of Rectangular Forceps.
- 1 Metallic or Hard Rubber Syringe.
- 1 Ear Spout. 1 Wilde's Polypus Snare.
- 1 pair of Ring Polypus Forceps.
- 4 Artificial Tympana.
- 1 Otoscope (Diagnostic Tube) and Explorer.
- 1 Eustachian Catheter, hard rubber.
- 1 Morocco-covered Case, lined with velvet.

Turnbull's Set of Ear Instruments.

\$68.

- 1 Troeltsch's Ear Mirror, with handle and headband.
- 1 set of (3) Rhinoscopic Mirrors, to fit one handle.
- 1 set of (3) Gruber's Tubular Specula, German silver, in a case, to be carried in the vest pocket.
- 1 Tuning Fork (C), to test the condition of the auditory nerve.
- 1 Explorer and Diagnostic Tube, pair.
- 1 Eustachian Catheter, hard rubber, small size.
- 1 Politzer's Apparatus, attachable to.
- 1 Capillary Spray, for injecting the middle ear.
- 1 Ear Syringe, hard rubber.
- 1 Turnbull's Curette, soft silver.
- 1 Turnbull's Angular Forceps, for removing foreign bodies.
- 1 Turnbull's Sickle-shape Knife and Curette, for opening furunculous abscess in the external meatus.
- 1 Ear Spout.
- 1 Clarke's Douche, for the ear and eye.
- 1 Wilde's Polypus Snare.
- 1 Probe.
- 1 pair of Polypus Forceps, Politzer's.
- 1 Gruber's Tenotome (3 blades).
- 1 Politzer's Tympanum Perforator.
- 1 Catarrhal Syringe, posterior nares.
- 1 pair Thudichum's Nasal Specula, right and left.
- 1 Powder Blower.
- 1 Drill, for perforating mastoid cells.
- 1 Morocco-covered case, lined with velvet.

AURAL.

ARTIFICIAL EAR.

An auricle, having the shape of the natural external ear, of gutta-percha or soft rubber, colored to resemble nature and attached by clasps or otherwise to the remnants of the ear lost by disease or accident. It is made in the following manner: first, a plaster of paris cast of the other, sound ear, is taken, then the model is reversed and a metal mold formed, into which plastic india rubber is cast and, finally, baked by the regular vulcanizing process; it is then colored by an artist to match the complexion of the wearer. The process is a slow one, requires from two to four weeks time and the presence of the patient for part of the time. Full particulars will be given on application.

NASAL.

RHINOPLASTY.

The object of this operation is to restore the nose in cases where it has been partially or entirely lost. Three chief methods have been described:

"1. *The method of Celsus*, which consists in bringing forward the skin of the cheeks, and forming the septum, if necessary, from the upper lip.

"2. *The Italian or Taliacotian*, called also the *German method*, on account of the application of it made by Von Graefe, which consists in paring the edges of the nostrils and uniting them to a graft taken from the arm, but left attached to it until union has taken place.

"3. *The Indian method*, practiced for ages in the East Indies, where cutting off the nose has been a common punishment for criminals, in which the graft is taken from the forehead."—DUNGLISON.

"Rhinoplasty is always an important operation. It rarely effects as much as it promises, and the noses thus made frequently shrink and diminish in size, forming tubercles whose appearance is sometimes more hideous than the original deformity. At the present time, when the manufacture of noses of wax, pasteboard or silver, attached to spectacles, has reached such great perfection, rhinoplasty is performed only in extreme cases."—"Bernhard and Huette."

ARTIFICIAL NOSES.

After much experimenting, an artificial nose, made of thin silver, shaped to conform to the rules of beauty and, at the same time, to resemble the lost member as nearly as possible, has been found the most satisfactory. It is accurately fitted to the skin, covering the remaining part of the nose as well as the opening. It is held in place by a spectacle frame superiorly, while a pair of springs, attached to its base, enter the fossæ and secure its position below. It can be worn with ease, is very light and, if nicely fitted, will hardly show points of attachment, being painted to correspond to the tint of the face.

FIG. 2146.—Loss of Nose.

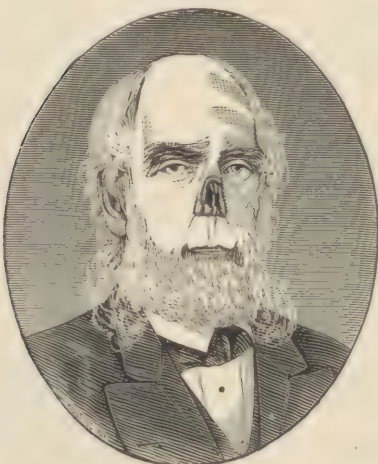


FIG. 2147.—Artificial Nose.



Full particulars will be given on application.

NASAL.

"The nasal cavities are liable to malformations and to various accidents and diseases, of which the most important are: hæmorrhage, ulceration, polypus, hypertrophy of the mucous membrane and foreign bodies."—"System of Surgery." Gross, Vol. II., p. 279. 1882.

Instruments are employed for freeing and enlarging the inferior nasal channel.

Rhinoscopy.—Examining or inspection of the anterior and posterior nares.

Medicating and Cleansing.—Douches, insufflators.

Epistaxis.—Stopping hæmorrhage.

Polypi and Foreign Bodies.—Removal of by forceps, snares, scoops, and destruction of polypi by hypodermic injections.

Hypertrophy of the mucous membrane and the erectile tissue covering the lower turbinated bones.—Wire snares, ecraseurs, galvano-cautery.

Deformity of the Nasal Bones, correction of; and

Deviation of the Septum.—Forceps, gouges, scissors, scalpels, clamps, &c.

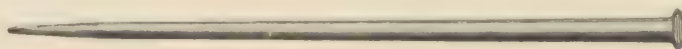
Nasal Stenosis.—Exostosis, Enchondrosis.

SIMPLE OBSTRUCTIONS OF THE NOSE.

"There are few who have not at some time or other experienced the discomfort and inconvenience of inability to breathe through the nose. A much greater amount of evil arises from such a condition than has hitherto been imagined. The obstruction depends on chronic inflammation or thickening of the mucous surface, which, throughout the windings of the nasal cavities and passages, goes by the name of the *pituitary*, *schneiderian*, or *olfactory* membrane. It often exists to such an extent as to block up the passage of the nose entirely, and thus obstructs the principal channel through which respiration is, or ought to be, performed, as well as impedes the performance of various other functions. Besides the unpleasant effects on the expression of the face of persons who are thus obliged at all times to keep their lips apart or their mouths open to enable them to breathe, the respiration, the voice, and the sense of smell, there is one other circumstance to which less importance has been attached than it deserves, namely, the connexion of nasal obstruction with defective hearing. A free state of the nasal passages is of great importance to the acuteness and preservation of hearing * * * without it the function of the eustachian canal could not be properly performed."

Nasal Probes and Dilators.

FIG. 2148.—Yearsley's Elastic Dilator (or Naso-Guttural Probe).



"The effects of this instrument have answered my most sanguine expectations. It has relieved a large number of cases to which other kinds of treatment would have been ill-suited and inefficacious. The majority of them were cases of simple obstructions; but it has also proved of essential service in cases of deafness, complicated with the thickening of the mucous membranes. The passing of the probe (dilator) once or twice a day soon dilates the canal to such a size as to permit the passage of air to and fro; and, in addition to this, it appears to exert a salutary influence on the tract of mucous membrane extending to the ear."

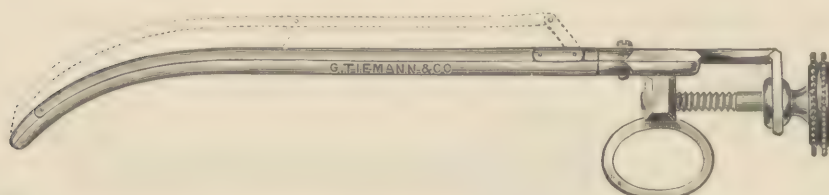
MODE OF USING THE NASO-GUTTURAL PROBE (Fig. 2148).

Until expertness is acquired, the patient should place himself before a glass, holding the instrument between the finger and thumb. He then introduces it into the nasal opening, in an *horizontal* direction. Being once inserted, the slightest force will cause it to glide along the floor of the nostril uninterruptedly, until its extremity strikes the back of the throat, the sensation of which is instantly distinguished by the patient. Here it should be allowed to remain a few seconds, and then gradually withdrawn, to be introduced in a similar manner along the opposite nostril. The operation should be followed by blowing the nose until the passages are free to admit the ingress and egress of air to and from the lungs.

When it is recollected how many thousands of cases of deafness, proved to be irremediable by ordinary means, are rapidly approaching by almost imperceptible gradations toward total deafness, the importance of any remedy which affords even a chance of arresting the disorder, still more of ameliorating or curing it altogether, will be duly estimated. One or the other of these results will very frequently follow the employment of the instrument. This is not its only advantage, as it proves of much service in removing the obstruction to the voice, smell, and respiration, and is beneficial in other minor points.—From "Yearsley on Obstructions of the Nose."

NASAL.

FIG. 2149.—Woakes' Dilator, for Widening the Inferior Nasal Channel.



"To overcome certain malformations of the lower spongy bone which tend to occlude the auditory channel of the nose and are especially opposed to the introduction of a eustachian catheter. The dilator is similar in principle to instruments adapted for stretching the rectum, &c. It is of the size of an ordinary silver eustachian catheter, and, being nearly straight, can, when closed, be insinuated beneath the spongy bone without occasioning a breach of tissue.

"By acting on the screw a gentle upward leverage is exerted upon the bone; the amount of pressure so exerted being increased with each application."

RHINOSCOPIC.

Specula for the Inspection and Examination of the Anterior Portion of the Nasal Cavities.

FIG. 2150.—Bonafont's Nasal Speculum.



FIG. 2151.—Bivalve Nasal Speculum.

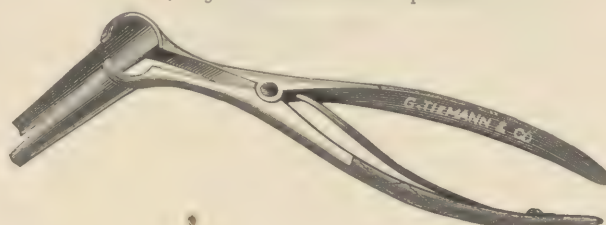


FIG. 2152. Simrock's Nasal Speculum.



FIG. 2153.—Elsberg's Nasal Speculum.



FIG. 2154.—Shurley's Nasal Speculum, with Ivory Slide, right and left.

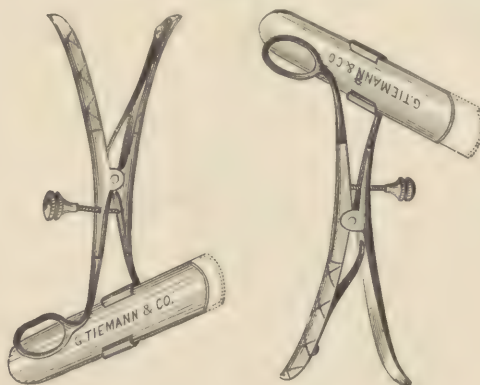


FIG. 2155.—Fränkel's Nasal Speculum.



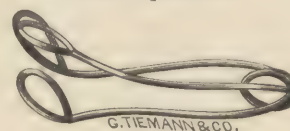
FIG. 2156.—Robert and Collins' Nasal Speculum.



FIG. 2157.—Collins' Nasal Speculum.



FIG. 2158.—Goodwillie's Nasal Speculum.



NASAL.

RHINOSCOPIC.

Specula, Rhinoscopes, for Inspection and Examination of the Anterior and Posterior Nares.

FIG. 2161.—Jarvis' Operating Nasal Speculum.
By compressing the lower portion of this instrument, after the blades have been introduced into the nose, the ring near the joint will slip downward and make the blades self-retaining.



FIG. 2162.—Jarvis' Nasal Speculum.



FIG. 2159.—Zaufal's Trichter Specula.

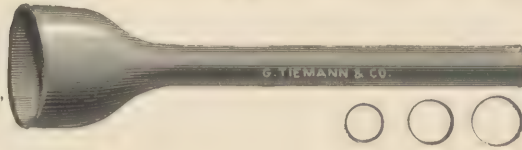


FIG. 2160.
Bosworth's Nasal Speculum.



FIG. 2163.—Andrew H. Smith's Nasal Speculum.

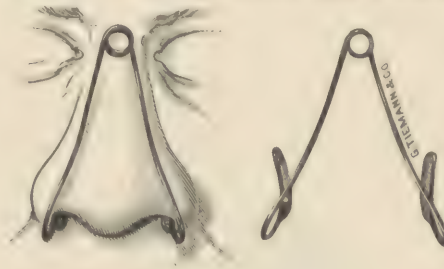


FIG. 2166.—Folsom's Nasal Speculum.

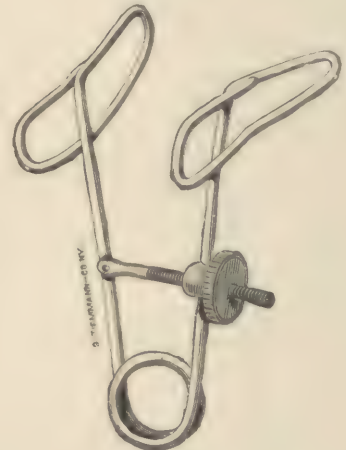
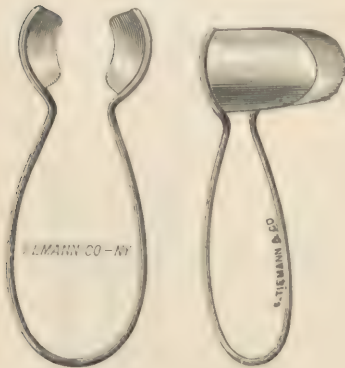


FIG. 2165.—Sexton's Nasal Speculum.



FIG. 2164.—Thudichum's Nasal Speculum.



Wagner's Rhinoscopic Set.

The instruments required for careful and thorough examination in the ordinary treatment of diseases of the nose are:

The Head Mirror.—The mirror is the same as is used in laryngoscopy; the focus power should be from ten to twelve inches. It is a matter of individual choice whether it is perforated through the centre or not.

Nasal Specula.—Frænckel's (Thudichum's, or Goodwillie's).

Tongue Depressor.—Turck's.

Rhinoscope.—A very small mirror, at right angles to the shaft. A larger one may be used if tolerated by the patient.

Nasal Probe.—Silver, heavy, flat and probe-pointed—for ascertaining the presence of necrosed or denuded bone, or a foreign body; its flat shape enables one to pass it easily through the meati for the purpose of ascertaining whether or not stenosis or stricture exists.

NASAL.

Wagner's Rhinoscopic Set. (Continued.)

Cotton-Holder.—For making topical applications of solutions to any part of the anterior or posterior nares.

Nasal Brush.—Soft camel's hair brush on a rod bent at an angle of 45° , fitted into either a permanent or shifting handle. It can be introduced behind the velum without coming into contact with the posterior wall of the pharynx, by which retching, gagging and nausea are avoided. By means of it solutions can be thoroughly applied to the posterior surfaces of the turbinated bones, septum and spaces between the septum and the bones. The posterior surface of the velum can also be touched, as well as the vault of the pharynx and the orifices of the eustachian tubes.

Insufflators.—Constructed of hard rubber, one straight and one turned to the angle of the nasal brush, for the posterior nares, but in the majority of cases the straight one will suffice. The hand-ball may be used, or the compressed air from a large receiver, for expelling the powder.

Sass' Spray Tube.—For cleansing and washing.—From "Diseases of the Nose." Clinton Wagner, M. D. 1884.

POSTERIOR RHINOSCOPY.

It is necessary to premise that all persons are not at once amenable to posterior rhinoscopy. For instance, where there is paresis of the palate, or hypertrophy of the fauces, or an excessively irritable faucial region, a preparatory course of treatment, directed to subdue the several obstacles, must be adopted before a satisfactory examination of the naso-pharynx can be accomplished. Various accessory measures have been recommended by authors, with the object of facilitating this inspection. Such are: catching the uvula in a loop of silk or wire, and by its means drawing forward the soft palate; passing a curved spatula behind the velum, and so making forward traction upon it, &c. * *

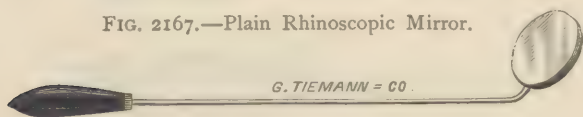
"Wales' method consists in passing a piece of soft string, previously stiffened at one end by saturation with mucilage (a useful addition suggested by Bosworth to facilitate its introduction), through the anterior nasal meatus, until it appears below the soft palate, when it is caught in a long pair of forceps and drawn out of the mouth. A similar process is then gone through with regard to the other nostril. The two ends of each piece of string are respectively tied together outside the mouth, firm traction being made while doing so upon the velum. The latter is thus held forward in a manner best tolerated by the stretched tissues, and space afforded through which to observe the exposed region. * *

The patient and surgeon should be arranged as for laryngoscopic observation, the former being directed to hold his head slightly forward, and to breathe through his nose while holding his mouth wide open. The observance of these details is essential to secure a flaccid and advanced position of the velum, which will otherwise tend to be drawn backward against the pharyngeal wall as soon as the tongue is depressed, thus rendering the proceeding an abortive one. It is just these preliminary steps that the patient can practice by himself, and, if ordinarily intelligent, will soon bring the region in question under control.

The surgeon now lightly depresses the tongue with a small tongue spatula, held firmly in his left hand, taking care not to place this too far backward.

With the right hand he introduces the small rhinoscopic mirror, previously warmed, into the pharynx behind the root of the tongue, taking care not to touch its sensitive posterior wall, and in such a way that its stem rests in the left commissure of the patient's mouth. By gently pressing the trigger with which the handle of the instrument (Fig. 2171) is furnished with his right thumb, the observer can change the angle of the mirror from the horizontal plane to a right angle, and can maintain it at any angle he may desire. The light reflected from the forehead mirror is now thrown upon the smaller one located in the pharynx, whence it is directed upward, illuminating the space above the velum, while the image of the part upon which the rays of light fall becomes visible in the glass of the rhinoscope. In this way the posterior wall of the pharynx, with the pharyngeal tonsil, the vault and the choanæ or posterior openings of the nares, with the corresponding aspect of the septum-nasi and the posterior surface of the velum palati, come successively into view, when the mirror is moved as above directed. To see the lateral walls of the pharynx and the orifices of the eustachian tubes and Rosenmüller's fossæ, it is necessary to turn the mirror slightly toward the side it is intended to view. The reversal of the image in the mirror, as in laryngoscopy, is a source of confusion at first, indeed, much practice is required to overcome it, owing to the complicated outline of the parts brought into view and the varying depths at which these are seated. It must not therefor be expected that the entire region will be seen in the mirror at one glance."—"Post-Nasal Catarrh." Woakes. 1884.

FIG. 2167.—Plain Rhinoscopic Mirror.



See "LARYNGEAL," "PHARYNGEAL,"
"NASO-PHARYNGEAL," "TONGUE DEPRESSORS,"
"TONSIL AND UVULA INSTRUMENTS."

NASAL.

POSTERIOR RHINOSCOPY.

FIG. 2168.—Jarvis' Rhinoscopic Mirror and Tongue Depressor.



A stout wire, after being made to divide and assume the form of a tongue depressor, is crossed upon itself and then shaped into a pincette. Mirrors of different sizes are received between the pincette's blades, and are held at any desirable angle for viewing the posterior nares, and at the same time facilitate depression of the tongue.

FIG. 2169.—Jarvis' Tape Holders.



"The tape-holders are intended to take the place of the unsatisfactory and disagreeable procedure of tying the ends of the tape, which passes around the palate. (See "Wales' method.") They are two small V-shaped spring clips, so arranged that the tape, passing through apertures in its blades, is caught by a tooth-like projection and firmly held. Pressure on the spring releases the catch and sets the tape free. One of the clips is provided with a rest for the ecraseur."—"Archives of Laryngology." Vol. II. April, 1881.

FIG. 2170.—Duplay's Rhinoscope.

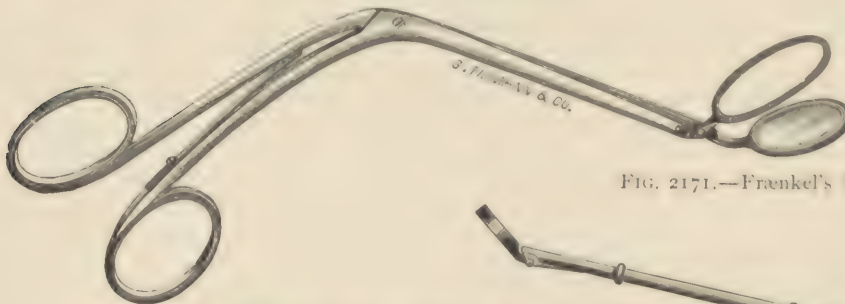


FIG. 2171.—Fränkel's Rhinoscope.

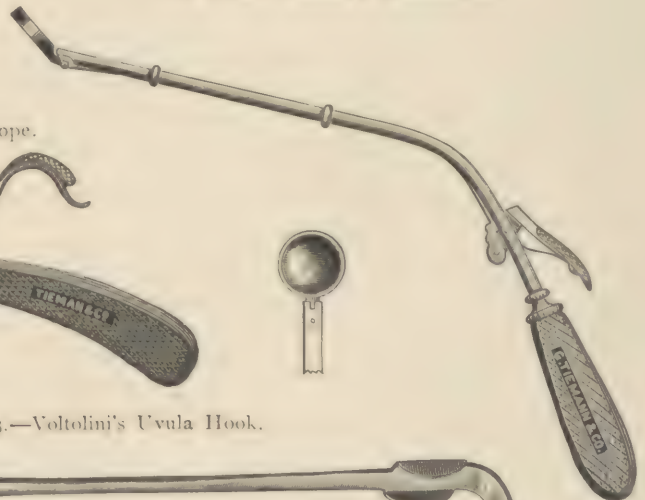


FIG. 2172.—Simrock's Rhinoscope.

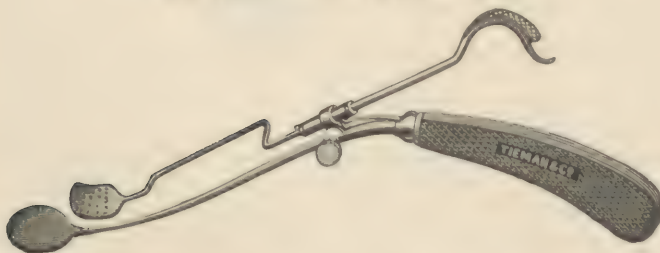


FIG. 2173.—Voltolini's Uvula Hook.



FIG. 2174.—Fränkel's Uvula Hook.



FIG. 2175.—Czermack's Uvula Hook.



NASAL.

Cleansing and Medicating the Nasal Passages. Douches and Irrigators.

Dr. Gruber believes that harmful effects of the nasal douche are due to the entrance of fluid into the middle ear, and that, however proper it may be to *intentionally* inject fluid in small quantities into a diseased cavity of the tympanum, it is manifestly incorrect to force it into an ear that was previously healthy, with no restriction as to quantity, as is done in the use of the nasal douche.

Dr. Elsberg prescribed the nasal douche for more than 1600 cases, and has experienced no ill results.

Dr. St. John Roosa does not believe that the nasal douche will *necessarily* cause aural disease, but that it is a dangerous means of treatment, which should be watched by the practitioner, and he hopes that the method of anterior syringing and the use of the posterior nares syringe may finally supplant the nasal douche."—"Treatise on the Diseases of the Ear." St. John Roosa.

There can be but little doubt that the nasal douche, as a cleansing apparatus, is tolerably effective, although not nearly so thorough in its action as has been generally admitted. Being familiar with the frequent inflammatory diseases of the ear occasioned by its use, I am convinced it ought not to be used.—"Nasal Catarrh," p. 20. Robinson. 1880.

If certain precautions in the use of the nasal douche are closely observed, not only will there be no unpleasant effects following its employment, but, on the contrary, the patient being pleased with its action, is not willing to do without it. In the first place, the bottom of the vessel should, under no circumstances, be elevated more than an inch or so above the eyebrows of the patient, as otherwise the pressure is so great as to force the water into the frontal sinuses or the eustachian tubes, giving rise in the first instance to intense frontal headache, and in the second to an inflammation of the mucous membrane of the middle ear. (Here follow directions as to temperature, density or specific gravity of the liquid to be used, and the proper selection of cases.) "Diseases of the Throat," p. 207. Seiler. 1883.

It is through the nose that normal respiration takes place, the post-nasal space being so located as to occupy an intermediate position between the nasal meati, which are the gateways of the respired current and the larynx, which admits the latter to the lungs through the trachea. It cannot be too strongly insisted upon that the mouth is only subsidiary to its function, and is used for this purpose only when obstruction exists in the naso-pharynx, by which the ingress of air through it is rendered difficult or impossible, or when very hurried respiration is excited by any cause, and then only as supplementary to the normal channel.—"Post-Nasal Catarrh," p. 108. Woakes. 1884.

FIG. 2176.—Clark's Nasal and Aural Douche.



FIG. 2177.
Thudichum's Nasal Douche.

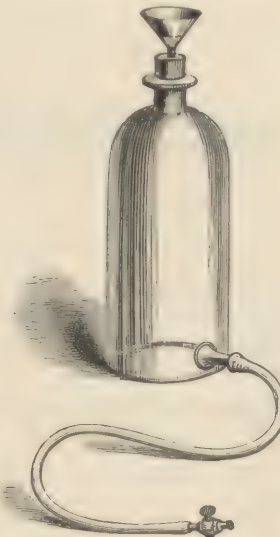


FIG. 2178.
Weir's Sniff Glass.

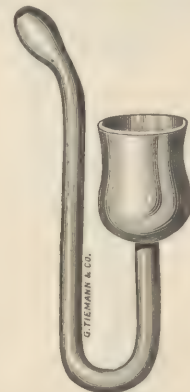
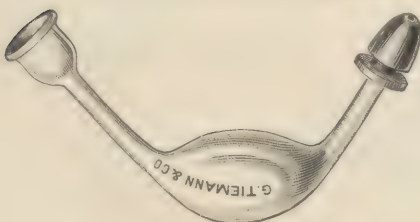


FIG. 2179.—Woakes' Nasal Irrigator.



A glass tube for holding the fluid, with curved up arms; one, tipped with a soft rubber nozzle, closes the nostrils when introduced. The bulbous portion is then raised until the fluid is felt by the patient in the nose; the patient then forcibly inspires, when the contents are drawn inward, passing into the pharynx, and are readily expelled through the mouth.

NASAL.

Cleansing and Medicating the Nasal Passages. Syringes, Douches and Sprays.

FIG. 2180.—Füllgraff's Nasal Douche.

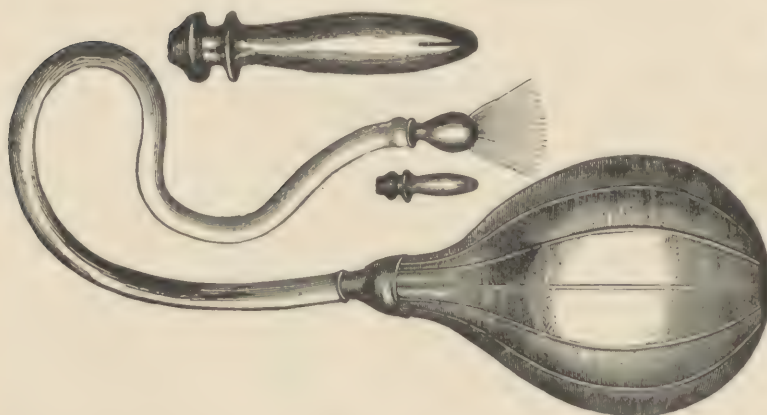


FIG. 2181.—Chapman's Nasal Spray.



FIG. 2182.—Hard Rubber Laryngeal and Posterior Nares Syringe.

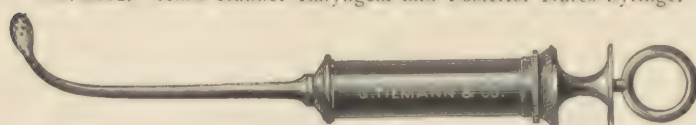


FIG. 2183.—Warner's Catarrhal Douche.



FIG. 2184.—Bennett's Posterior Nares Syringe.



FIG. 2185.—Yearsley's Naso-Pharyngeal Syringe.



For the purpose of washing the back part of the nares, the upper part of the throat and the mouths of the eustachian tubes.

The apparatus is composed of a cautchouc bottle for the reception of the gargling fluid, and an elastic tube to convey the fluid across the floor of the nostril. The tube is introduced along the nostrils, in the same way as the elastic nasal dilator (Fig. 2148). Before pressure is exercised on the previously filled bottle, withdraw slightly the extremity of the tube from the back of the throat, to admit of the fluid being expelled; or the contents of the bottle may be squeezed out during the act of withdrawing the instrument, whereby not only the throat and adjacent parts, but the nasal passages also, become well washed by the injection.

If the facility of washing the throat through the nose were known, it would not be long before it would become a general practice; for it is very certain that *gargling* the throat through the mouth, though so frequently recommended, is but rarely accomplished. Owing to the action of the veil of the palate, the gargling fluid is confined to the cavity of the mouth, and rarely enters the throat at all.—“Yearsley on the Throat,” p. 74.

NASAL.

Cleansing and Medicating the Nasal Passages. Douches, Applicators, Brushes, Insufflators.

FIG. 2186.
Füllgraft's Laryngeal and Posterior
Nares Douche.



FIG. 2187.—Powder-Blowing Tubes, for the Posterior Nares.

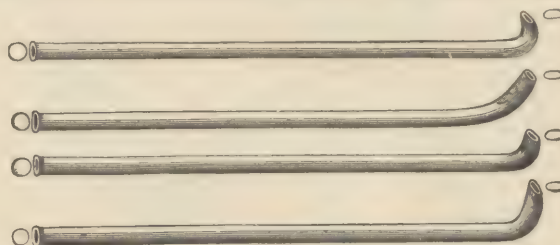


FIG. 2188.—Robinson's Powder Blower.



FIG. 2189.—Bosworth's Applicator.



FIG. 2190.—Wagner's Post-Nasal Brush.
2 Stems, 12 Brushes.

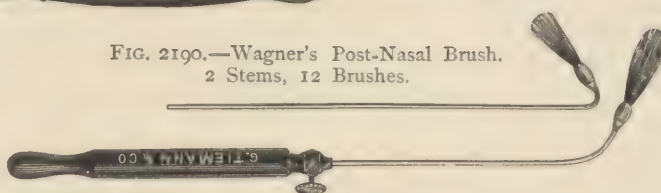


FIG. 2191.—A. H. Smith's Nasal Applicator, for Nitric Acid.

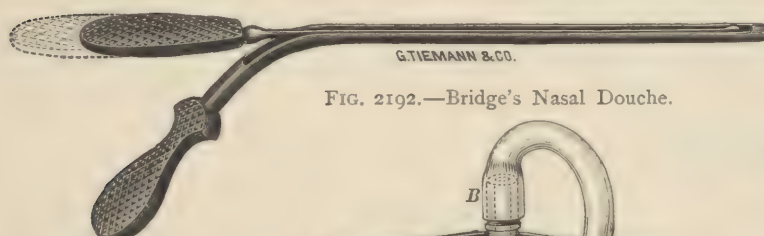


FIG. 2192.—Bridge's Nasal Douche.

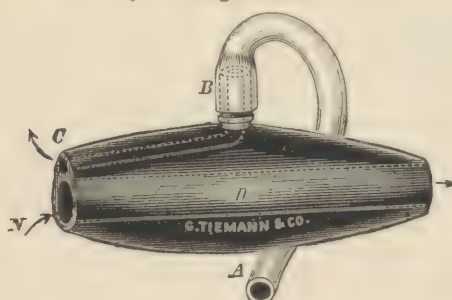
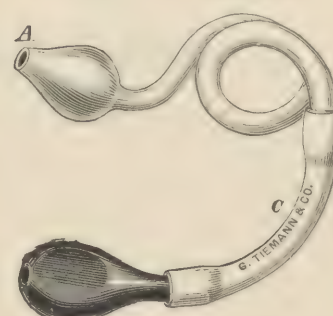


FIG. 2193.
Bridge's Auto-Insufflator.



See "ROOSA'S
IODINE APPARATUS,"
page 201.

NASAL.

EPISTAXIS.

Clamps, Tampons, Canulas, to arrest Hæmorrhage.

FIG. 2194.—Caro's Nasal Clamp.

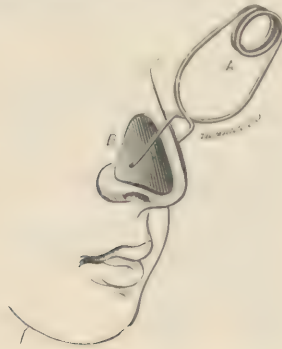


FIG. 2195.—Rubber Tampon for Epistaxis.

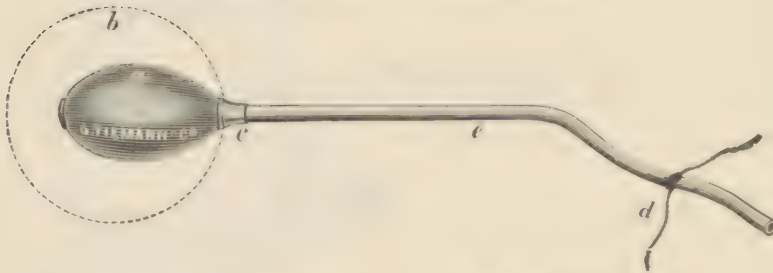
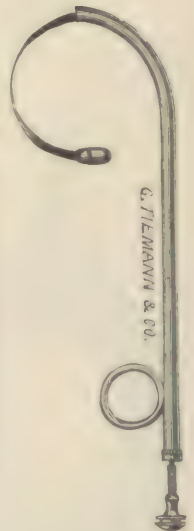


FIG. 2196.—Belocq's Canula for Epistaxis.



Nose-Bleeding.

"A common case of epistaxis requires but little treatment, especially if in a young person. Light diet and a dose or two of the sulphate of magnesia will be sufficient. The flow of blood has been arrested by directing the patient to stand up with his head elevated, compressing the nostril with the finger, raising the corresponding arm perpendicularly, and holding it in this position for about two minutes. In more severe attacks cold and astringent washes of alum, sulphate of zinc, weak sulphuric acid, or creosote, may be used, and the nostrils be plugged anteriorly; but if the bleeding goes on posteriorly, *choanorrhagia*, the posterior nares must be plugged likewise—the patient being kept with the head elevated, and on dry diet."—DUNGLISON.

Ordinary Method of Plugging the Nose.

"A roll of lint (or styptic cotton) to stop the posterior opening of the nasal fossa is made, and to this a very strong silk thread is tied, whose extremities are long enough to reach from behind forward through the nostril. Belocq's sound, or a very flexible gum-elastic catheter, is introduced by the nostril; when the extremity of the instrument is in the pharynx, the button of Belocq's sound is sprung—or, if a gum-elastic catheter is used, its end is drawn out through the mouth; to this the threads of the plug are attached, and by withdrawing the catheter they are brought from behind forward through the nostril. By pulling upon the threads the plug is introduced into the posterior nasal opening, which it stops as completely as possible. A second plug, slid between the two threads, should be tied into the nostril in front and allowed to remain for two or three days.

"To withdraw the plugs, the thread in front of the nostrils must be cut; the posterior plug can be seized through the mouth by a pair of forceps, or pushed backward into the pharynx by means of a catheter carried through the nostrils. * * * It is more surgical to attach a ligature to the posterior plug, before its introduction, which is brought out at the mouth and attached temporarily in front; by drawing on this the posterior plug can be more readily removed. Without this precaution the withdrawal of the posterior plug is sometimes a troublesome and very painful process. Sponge is a good substitute for lint as a material for plugs."—"Bernhard and Huette's Manual of Operative Surgery." Am. Ed., p. 193. 1857.

The rubber tampon (Fig. 2195) is introduced into the nasal fossa by means of a sound; air or water is then thrown in, and the end, outside of the nostril, firmly secured.

NASAL.

POLYPI AND FOREIGN BODIES.

Removal by Forceps, Snares, Scoops, Probes, Torsion, Strangulation, Ecrasement and Galvano-Cautic.

FIG. 2197.—Gross' Polypus Forceps.



FIG. 2198.—Polypus Forceps, Crossing Blades.



FIG. 2199.—Nasal Polypus Forceps.

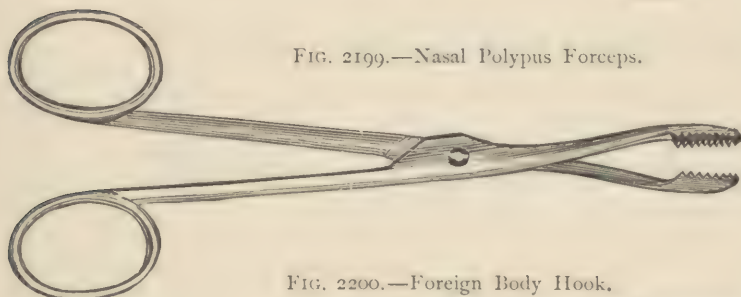


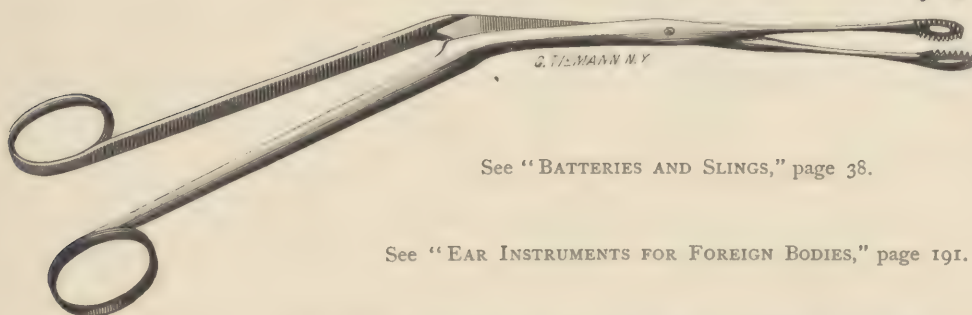
FIG. 2200.—Foreign Body Hook.



FIG. 2201.—Buck's Nasal and Ear Curette.



FIG. 2202.—Simrock's Polypus Forceps.



See "BATTERIES AND SLINGS," page 38.

See "EAR INSTRUMENTS FOR FOREIGN BODIES," page 191.

FIG. 2204.—Upson's Syringe, for Hypodermic Injections of various substances for the Destruction of Polypi.

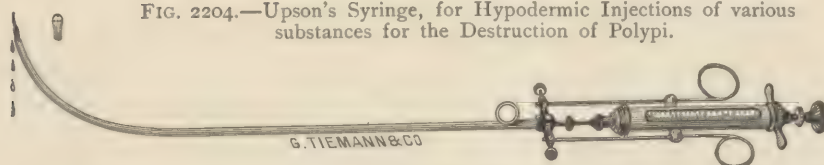
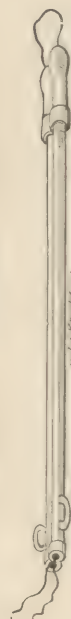


FIG. 2203.—Nasal Polypus Canula.



"It consists of an ordinary hypodermic syringe, provided with a long, hollow needle, which is passed through a silver canula properly curved at its extremity. The outer surface of the needle, for a short distance from its attachment to the syringe, has cut upon its surface a screw-thread, which is fitted with a traverse-nut, to regulate the depth of puncture of the growth. Two shanks, with finger-rests at one end, are passed through rings on the side of the syringe and attached at their other extremity, by means of set-screws, to the canula, to enable the surgeon to operate the instrument with one hand. The flat wings at the end of the syringe serve as thumb-rests. The tip of the canula is made to unscrew, and in its place can be fitted the fine spray-jet which accompanies the instrument. * * *

NASAL.

Destruction of Polypi by Hypodermic Injection. Use of Upson's Syringe (Fig. 2204.)

"First charge the syringe with the desired quantity of the solution to be injected—I generally prefer acetic acid, grt. x.—xv.; then place the patient in a good light—either direct or reflected—draw forward and depress the tongue with a proper instrument, which may be entrusted to the patient to hold, or the tip of the tongue may be covered with a napkin, drawn forward and held out of the way by the patient. After cautioning the patient to breathe quietly through the nose, introduce the rhinoscopic mirror below and a little back of the palate, and, as soon as you secure a good image in the mirror of the growth, introduce the canula with the free hand, project the needle the desired depth into the growth, move the thumb back from its rest to the piston, and slowly inject the contents of the syringe into the tumor."—CH. R. UPSON, M. D., Surgeon to the Department of Nose, Throat and Lung Diseases, Atlanta Hospital, Atlanta, Ga., *Medical Record*, May 14, 1881.

For Removing Polypi and Hypertrophied Nasal Tissue.

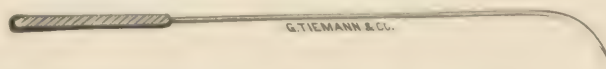
FIG. 2205.—Jarvis' Wire Snare Ecraseur.



The *ecraseur* consists of a long and short canula, the latter of which glides over a screw-thread, cut on the former. A milled nut, fitting this thread, is intended to push the outer canula before it. Fine steel wire is drawn through the long canula and its ends are attached to retention pins on the short one. As the outer canula cannot turn, there is no twisting of the wire loops formed. A graduated scale may or may not be cut upon the smooth surface of the screw-thread, to give the dimensions of a growth and indicate the moment of its complete division by the wire.

In using the *ecraseur*, pass the two ends of the wire through the main canula, entering them at its distal extremity, and twist them around the retention-pins. A loop is formed, whose size, of course, depends upon that of the growth. This loop should be flattened against the orifice of the canula, at the wire's two points of exit, so as to form a point of resistance for its fixation, when traction is made. It can now be placed in any desired position, and firmly held there by making a few turns of the nut. So we have an elastic ring formed, not to be permanently moved from its position; on account of its elasticity, it can be made to accommodate itself to the narrowest and most tortuous passages. Giving the wire loop a twist toward the side of the nose occupied by the growth, it is fixed by a turn of the nut and passed into the nostril. Holding the rhinoscopic mirror (Fig. 2168) in one hand, the position of the wire loop in the posterior nares is carefully watched, while it is steadily advanced with the other hand, until seen to encircle the growth. The tip of the wire loop has already, by excurvation, been made to assume a point considerably to one side of the axis of the main canula; hence, firm pressure is exercised upon the anterior part of the base of the growth, by the end of the canula, and, at the same time, the apex of the wire loop is pressing firmly on its posterior border. On drawing the wire home, the tissue is cleanly divided, and, if not too large to pass through the nares, it will generally be drawn out clinging to the snare. Make traction very slowly, stopping at short intervals, in order to cause the slightest amount of hæmorrhage.

FIG. 2206.—Transfixion Needle.



"The transfixion needles have small metal handles, and are of various shapes and sizes.

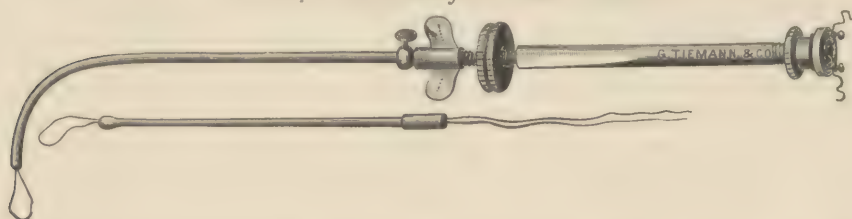
"Extensive posterior hypertrophies (especially the inferior turbinated variety), and soft sessile anterior hypertrophies, can be removed with the small snare. Firm non-pedunculated anterior hypertrophies, and small and hard anterior hypertrophies, require both *ecraseur* and transfixion needles. In using the transfixion needle, the amount of tissue requiring removal is carefully determined and the point of the needle directed accordingly. The loop will be caught by the point of the needle, projecting into the nostril, and a few turns of the milled nut causes the wire to sever the transfixed tissue. In transfixing posterior hypertrophies, the position of the needle's point can be determined by the rhinoscopic mirror (Fig. 2168). Curved needles should be used in transfixing anterior hypertrophies, in order to bring the needle's point into view. Whole lengths turbinated hypertrophies should be removed in the same manner, either in whole, or, when very extensive, in sections. Nasal hypertrophies of every size and description can be permanently got rid of by this simple method."—"Transactions of the American Medical Association." Vol. 32. 1881.

See "JARVIS' TAPE HOLDERS," Fig. 2169.

NASAL.

For Removing Polypi and Hypertrophied Nasal Tissue by Ecrasement.

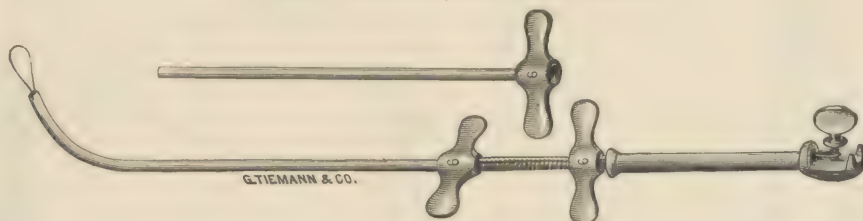
FIG. 2207.—Bosworth's Jarvis' Snare Ecraseur.



"I have had constructed an ordinary snare with a distal tube six inches in length; the end of this is curved in a quadrant of a circle whose radius is one and one-fourth inches. This is now mounted with a No. 5 piano wire, which I regard as by far the most useful number, as combining elasticity, strength and resistance. Having observed the growth and carefully estimated its size, a loop is formed which will embrace it, and is then bent forward over the end of the instrument, in order to give it a decided kink. The wire is now played out of the snare about an eighth of an inch, and the whole loop is now thrown backward toward the handle of the instrument, giving it another bend. As will be seen, it is in a position for easy introduction behind the palate, without touching the part, and may be passed immediately to the base of the growth. The palate of course is now immediately retracted by reflex irritation, but only embraces the tube of the snare, without in any degree hampering the manipulation.

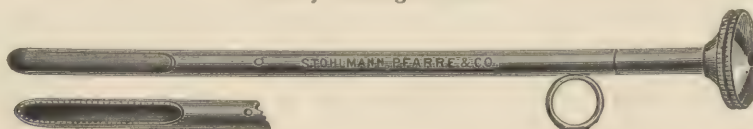
"The instrument is now held firmly in place, while the loop is rapidly drawn in by turning the screw. As the wire is drawn in, the loop is thrown backward with considerable vigor, and embraces and severs the growth. In this manner even a broadly sessile growth is easily seized and extirpated. There is but trivial hæmorrhage, but little pain or retching, and the whole manipulation is accomplished very easily, simply and speedily. After the withdrawal of the instrument, the tumor is expelled through the nose by blowing. Occasionally it drops into the pharynx below, but this is very rare. In no case has any patient experienced the slightest annoyance from the growth dropping too far down in the air-passage, nor do I regard this as an accident that is liable to happen. The operation by this method has never required an anæsthetic."—*The Medical Record*. January 13, 1883.

FIG. 2208.—Bettman's Jarvis' Snare Ecraseur.



"Jarvis' wire ecraseur, modified by Dr. Jefferson Bettman, shown at the International Medical Congress, was devised specially for the removal of nasal polypi and hypertrophic tissue covering the turbinated bones. Its action is simple and efficient, and, when properly used, it should occasion but little pain and loss of blood. In the original instrument, the sliding or outer canula was propelled by a milled nut or wheel, which has now been replaced by a flattened bar; this, for mechanical reasons, entails less expenditure of force, and can be manipulated with greater ease and comfort. One of the chief points in the modified ecraseur consists in the clamp-screw to fasten the free ends of the wire loop. In Jarvis' instrument these were wound around small retention pins, and, if the case required, had to be undone and rewound. This is obviated in the modification; a simple turn of the screw releasing or clamping the wire. Another point hereby gained is the impossibility of a fracture; the wire, except at its looped extremity, remaining straight throughout its entire length. The straight tube, which is used for operations in the nasal cavity, can be unscrewed from the handle and replaced by a long tube with the post-nasal curve, so that tumors or redundant tissue, growing from the posterior nares or the naso-pharyngeal space, can be operated upon through the mouth. The wire used is pianoforte strings, Nos. 5 and 6."—*London Medical Record*, p. 480. Nov. 15, 1883.

FIG. 2209.—Dr. A. H. Smith's Canula Scissors, for the Removal of Neoplasms. Cut by rotating the screw.



NASAL.

The Surgical Treatment of Hypertrophied Mucous Membrane. (Evulsion.)

"In excessive hypertrophy of the mucous membrane covering the turbinated bones, especially the middle and inferior, closing the meati, and thus interfering with nasal respiration; when presenting in the rhinoscope a baggy cedematous condition, somewhat like a gelatinous polypus; and upon inspection of the anterior nares frequently presenting the same appearance. Several methods are practiced for the removal of the superfluous tissue. Nelaton performed it with scissors. Gross has treated these cases by tearing away the redundant tissue, and in some cases the middle turbinated bone.

"Beverly Robinson urges caution in its adoption, as several cases in which he operated were followed by pain and swelling of the face and abundant discharges from the nasal fossæ; he subsequently devised a pair of forceps with grooved and serrated edges, which he has used with satisfactory results."—"Diseases of the Nose," p. 75. Wagner.

FIG. 2210.—Robinson's Evulsion Forceps.



For the Turbinated Bones.

FIG. 2211.—Woakes' Scissors, for Excising a portion of the Middle Turbinated Bone.



FIG. 2212.—Woakes' Nasal Plough-Guide.

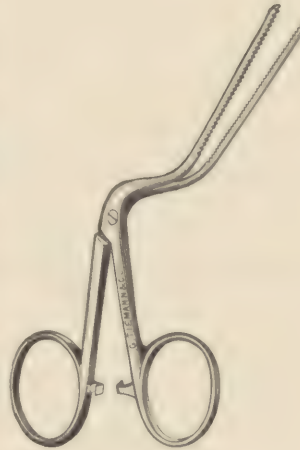


FIG. 2213.—Woakes' Nasal Plough.



"Woakes' nasal plough guide (Fig. 2212), for removing lymphoid vegetations or hypertrophic proliferations, along with a strip of the inferior turbinated bone, and for exostosis.

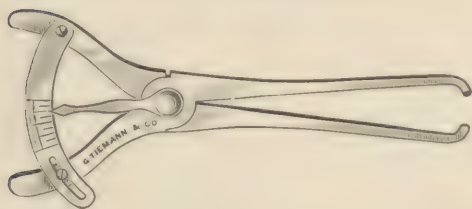
"A pair of forceps, with thin but strong blades, so shaped that every other part is out of the way of the surgeon and does not interfere with his vision. These are fitted with a catch near the bows. The free end of the spongy bone is grasped by the blades of the forceps at the line where it is intended to divide the bone, and, the catch being closed, it now serves as a guide for the *nasal plough*, with which the severance of the bone is effected. The latter is a kind of gouge, a portion of the cutting surface of which is curved upon itself, while the rest projects forward keel-wise, and ends in a blunt point. The blunt point of the plough is now passed beneath the turbinated bone and outside the forceps (as regards the middle line of the body), to which it readily adapts itself. It is now pushed freely along the nostril, keeping it close to the forceps, until the post-nasal space is entered. It is then withdrawn, followed by the forceps, when the latter will retain the growth, with a narrow strip of the spongy bone attached. By this method it is possible to regulate exactly the width of the slice which is to be removed from the spongy bone, besides which the difficulty of the operation is reduced to a minimum."—"Post-Nasal Catarrh." Woakes.

NASAL.

SEPTUM.

The typical *septum nasi* is a straight, flat wall or partition, running through and separating the nasal cavities. Though constituted posteriorly of bone and anteriorly of cartilage, it is not usual for any line of demarcation to exist indicative of this division. The covering of muco-perichondrium in front passes backwards into the muco-periosteum by quite insensible gradations; nevertheless, the existence of this duplex formation must not be lost sight of, because it will assist to differentiate the character of any neoplasm which may be present, to note whether it grows from the osseous or cartilaginous section. It is not common, however, to see the septum so architecturally proportioned as the above intimation implies, many degrees of deviation occurring which are quite consistent with a normal breath-way. The lateral divergencies are most frequent into the left nostril, and have a corresponding depression on the opposite side. What the observer has to note is, whether they be sufficiently marked to obstruct the channel, and whether any adventitious thickening is present, with or without such deviation, and also to observe the lining membrane for congestion, ulcers, &c. Note should also be taken whether dislocation of the anterior aspect of the septum from the maxillary spine exists, for, though not a common occurrence, this displacement is occasionally met with, either alone or in combination with other abnormalities.—“Post Nasal Catarrh.” Woakes.

FIG. 2214.—Seiler's Septometer.



For measuring the thickness of the nasal septum, and by means of which a differential diagnosis between the local thickening, as exostosis and deviation of the septum, can be made more readily and accurately than by inspection of the nasal cavities alone.

The septometer is held by a wooden handle, screwed at an angle into the lower blade, so that the hand is below the patients' nose and does not obstruct the view of the points, and also in order to prevent any embarrassment of the delicate motion of the blades. The index hand will point out position

and variations of thickness as the instrument is passed up or down.—Carl Seiler, M. D., in *Medical News*, Dec. 2, 1882.

For Operations on the Distorted and Depressed Fractured Nasal Bones.

FIG. 2215.—Adam's Rhinoplastos.

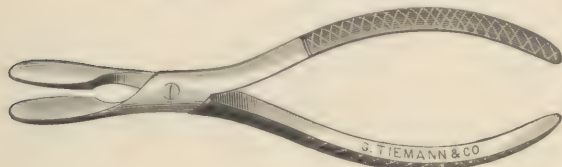


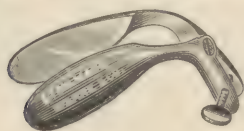
FIG. 2216.—Weir's Rhinoplastos.



FIG. 2217.—Bosworth's Rhinoplastos.



FIG. 2218.—Bosworth's Nasal Clamp.



Mr. William Adams, of London, E., classed all cases of broken noses under two heads:

1. Injury limited to anterior or cartilaginous portion, in which the deformity consists of depression and lateral bending with partial displacement from its bony attachment.

2. Fracture of the nasal bones, with more or less depression and lateral displacement, together with crushing and bending of the cartilaginous septum.

He recommends forcible straightening of the septum by forceps (Fig. 2215), one blade of which is introduced into each nostril, and, if a depressed fracture of the bones be also present, that these two be fractured by crowding at the same time the forceps strongly upward, assisting the manœuvre with powerful pressure with the thumb and fingers outside. After the deformity of the septum has been thus overcome, the wearing for several days of a mildly pressing screw clamp, to keep it straight, and, in case of refracturing the bones, their reposition to be assisted by a *nose truss*, so arranged that pressure by a screw pad could be made at the point of greatest convexity; after which he introduced ivory plugs (FIG. 2226), which the patient can remove and re-introduce at pleasure.

FIG. 2219.—Gouley's Nasal Clamp.



NASAL.

For the Treatment of the Deviated Septum Narium.

I shall discuss the treatment of the deviated septum, as a most common cause of catarrh. As with a button in the nostril, so that thorn in the flesh, a deviated septum, must be removed to cure catarrh.

Since several instruments will be presented to your notice, I trust you will not interpret them as indicating dissatisfaction with any one method and recourse at random to another, but as providing against certain possible contingencies. The very structure and shape of the septum warrants this assertion. We may meet bone, cartilage or mucous membrane. The bone will break or dull our knives, the rongeur forceps may strip off or mutilate unnecessarily the mucous membrane, and either may unfortunately perforate the deviated cartilage. For opening the field of operation I employ my ring-drop nasal speculum (Fig. 2161), since in my hands it has proved the best for painlessly and persistently dilating the nostrils. In the treatment of cartilaginous and soft structural deviations of the septum, I have for several years employed nothing more than my ecraseur with transfixion needles. Instead of using No. 5 piano wire, originally recommended and introduced by me for the removal of turbinated hypertrophies, I employ Nos. 0 and 00 piano wires. The exclusion of the question of hæmorrhage in operations by ecrasement is an additional recommendation for the employment of fine wires, acting like knives. The employment of the ecraseur for this purpose must be invariably combined with the use of my transfixion needles (Fig. 2206).

The removal of cartilaginous and soft deviated tissues by ecrasement has been followed by most excellent results in my hands, and it is to be preferred for this purpose.

It is often desirable to economize time, and, in order to do so, I have devised a fenestrated cartilage forceps and trimming scissors. Their blades are made almost at a right angle, to enable the operator to obtain a clear view of the field.

The cutting edges of the fenestrated forceps resemble somewhat, in shape and action, the ordinary ticket-punch. A ring on the fixed blade is intended to slip over the middle finger, and a knob on the free one is manipulated with the thumb. This arrangement enables one to seize and divide the cartilage with great facility.

FIG. 2220.—Jarvis' Fenestrated Cartilage Forceps.

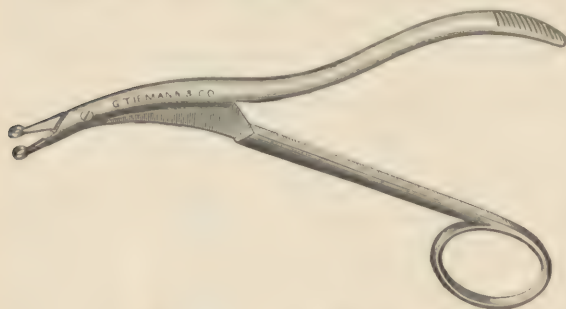


FIG. 2221.—Jarvis' Trimming Scissors.

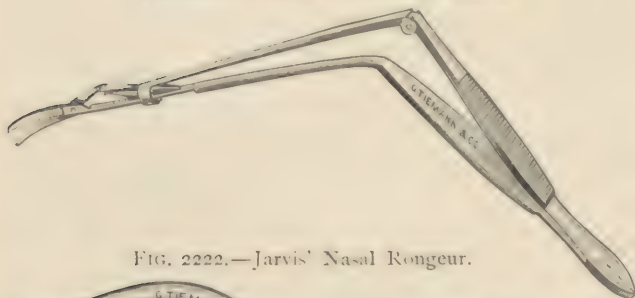
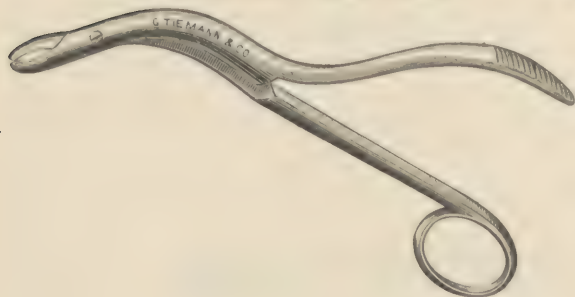


FIG. 2222.—Jarvis' Nasal Rongeur.



The trimming scissors are convenient for removing asperities remaining after the other instruments have been employed. The instrument is grasped like a pistol, firm pressure being exercised against its lateral margin by the index finger.

Thus far the instruments shown have applied only to cartilage and hypertrophied mucous membrane. Bone blunts or breaks their keen edges, and we may have to treat an osseo-cartilaginous deviation of the septum.

This little instrument, essentially a rongeur forceps, has, in my hands, most satisfactorily accomplished this result. Its two blades are hollowed to cut like the teeth of a rodent. The instrument has the proper nasal curve.

A great advantage possessed by this bone forceps is the control exercised over it by the operator. Each osseous projection can be distinguished over the edge of the upper blade and deliberately crushed away by the keen-edged cutting surfaces, and by a kind of gnawing process large sections of the bone are removed with rapidity and precision. All the methods thus far mentioned accomplish their purpose by removing the superfluous or deviated tissues or the turbinated structures opposite the deviated point.

[From "The Etiology and Treatment of Nasal Catarrh, with Special Reference to the Deviated Septum." By William Chapman Jarvis, M. D., Lecturer on Laryngology and Diseases of the Throat in the New York University Medical College, in *The Medical Record*, March 14, 1885.]

NASAL.

Excision of Cartilage in Nasal Occlusions due to Deviated Septum.

FIG. 2223.—Roberts' Septum Punching Forceps.



FIG. 2224.—Weir's Double Gouge Forceps.

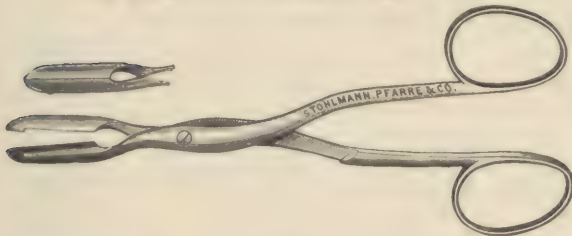


FIG. 2225.—Steel's Septum Forceps.

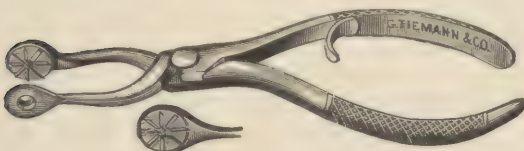


FIG. 2226.—Nasal Plug.



moved and a wooden, hard-rubber or ivory plug (Fig. 2226), shaped to fit the cavity, is inserted into the formerly obstructed nostril, and is kept there for about forty-eight hours, when it is replaced by a plug of cotton, which must be removed daily until the cuts in the septum have firmly united and the septum remains straight without support.—“Diseases of the Throat, Nose and Naso-Pharynx.” Carl Seiler, M. D. 1883.

FIG. 2227.
Jarvis' Modification of Steel's Septum Forceps.



In order to prevent sloughing away of the flaps, for lack of nutrition—due to close cutting of the star-shaped knives of Steel's ordinary instrument—Dr. Jarvis' has fenestrated the star, so as to leave the centre of the portion to be operated upon uncut. The blades of the forceps are curved, to facilitate vision. The lock of the forceps, almost straight, is made so as to allow the introduction of its blades, separately, into the nostrils. The knives, removable, fit either blade, so that they may be suitably fixed for introduction into the open nostril.

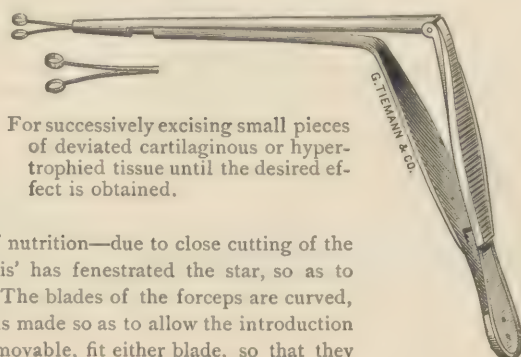
Dr. John B. Roberts' septum cutting forceps, with fenestrated cutting edge, for punching out sections of the septum, to make its replacement more stable. The opening becomes smaller on cicatrizing and frequently completely closes.—*Medical and Surgical Reporter*, May 20, 1880.

When the deviated septum causes, as is frequently encountered, an almost complete occlusion at or near the external orifice of the nose, the remedy is readily applied. It is to cut off, with a sharp knife or scissors, the projecting portion of the cartilage. This little operation I have found to be facilitated by using a small double gouge forceps, mounted like a dressing forceps. The same instrument will serve to cut away a turbinated bone, or those not very rare exostoses from the vomer that sometimes shut up the middle and inferior meatuses.—From “On the Relief of the Deformity of a Broken Nose by some New Methods.” By Robert F. Weir, M. D., *New York Medical Record*, March, 1880.

Steel's septum forceps has inserted into one of its blades a number of knives, at right angles to the surface and arranged in the shape of a star, the septum is punched at its greatest curvature once, or, if the bend extends far back, twice,

by introducing the blade carrying the knives into the open nostril and the unarmed blade into the closed one, and then compressing the handles. The punch is then removed, and, with a pair of forceps with flat blades (Adams', Weir's or Bosworth's, page 217), the septum is forcibly straightened, which becomes possible since the triangular pieces produced by the cut made with the punch lap, and thus the distance from the base to the top of the septum becomes diminished. Having accomplished this the forceps is removed

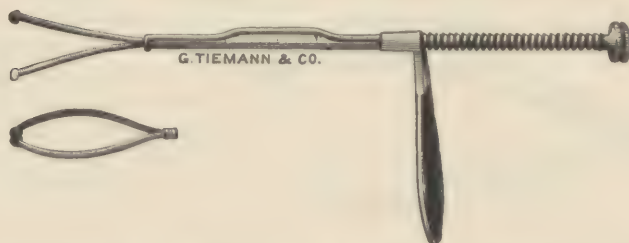
FIG. 2228.—Jarvis' Excisor.



For successively excising small pieces of deviated cartilaginous or hypertrophied tissue until the desired effect is obtained.

NASO-PHARYNGEAL.

FIG. 2229.—Jarvis Rhinometer,
used for measuring the size of normal and diseased nares.



Exostosis of the Septum and Congenital Malformations.

Exostosis of the septum proper, originating in the vomer and extending towards the outer wall of the nose, requires to be perforated with a drill (see p. 109). Through the orifice thus obtained a small saw may be worked and a sufficient portion of the mass removed to re-establish the breath-way. This operation may be performed most safely with the finger in the post-nasal space, the patient being gagged and anæsthetized. Should the new orifice have a tendency to close up, it may be re-opened by galvano-cautery.

It is quite practicable with one of these saws to remove small exostoses of the septum, where sufficient room exists for working it, without prior recourse to drilling.—“Post Nasal Catarrh.” Woakes.

Evulsion of the Pharyngeal or Luschka's Tonsil.

Although it is possible to effect some slight subsidence in the enlargement of the pharyngeal tonsil by the repeated application of such styptics as nitrate of silver, solution of chloride of zinc, &c., this method of treatment gives only a partial result, and requires a long period to accomplish even this. Evulsion of the mass is the only measure in which confidence can be placed. The choice of methods for accomplishing this object lies between the cutting forceps, the galvano-cautery and the wire snare.—“Post-Nasal Catarrh.” Woakes.

FIG. 2232.—Loewenberg's Pharyngotome.



the exact spot where they are to be closed upon the mass. In this way, also, the operator can detect, and so secure the removal of all remaining exuberant tissue. If, upon examination of the choanal orifices, the villous fringe exists (spoken of elsewhere), it should be scraped off with the finger nail. If attention to this point be neglected, an apparently successful operation, which has yielded a large aggregate mass of tissue, will prove abortive as regards results, because the fringe of itself constitutes a complete obstacle to nasal respiration.

FIG. 2233.—Wagner's Post-Nasal Forceps.



See “PHARYNGEAL,” p. 247.

FIG. 2231.—Woake's Nasal Saw.



A gouge forceps, by means of which one is enabled to seize readily such of the vegetations as grow on the posterior and lateral walls of the pharynx. In using this pharyngotome, the index finger of the left hand should be introduced into the space through the mouth, which must be kept open by a gag, to direct the blades of the instrument to

It is necessary to repeat that deafness, associated with hypertrophic catarrh of the pharynx, can only be relieved by securing the normal action of the eustachian tubes, and that, in nine cases out of ten, the cause of their defective functioning is in the naso-pharynx. Direct treatment of the middle ear by catheterization, &c., can therefore accomplish little until the hyperplasias which block the approach to the tubal orifices have been got rid of or have been greatly reduced in substance.—“Post-Nasal Catarrh.” Woakes. 1884.

MOUTH AND THROAT.

Mouth.—"The opening in the face or forepart of the head through which food is received and the voice uttered ; the aperture between the lips ; also, the cavity within the lips, containing the jaw, teeth and tongue."—WEBSTER.

Throat.—"The portion of the neck anterior to the spinal column, with its cavities and passages."—WEBSTER.

Also, "the pharynx, the common origin for the digestive and respiratory passages."—DUNGLISON.

Classification of Mouth and Throat Instruments.

FOR OPERATIONS ON THE JAWS AND LIPS, IN THE ORAL CAVITY, AND FOR THE SURGICAL AND THERAPEUTIC TREATMENT OF THROAT AILMENTS.

SPACIUM ORIS.	ISTHMUS FAUCIUM.	PHARYNGEAL-LARYNGEAL.
Extraction of Teeth, Dental.	Tonsils, Uvula and Soft Palate.	Larynx, Voice.
Antrum.	Excision of Tonsil.	Laryngoscopic.
Harelip.	Excision of Uvula.	Laryngeal Operating.
Staphyloraphy.		
Uraniscoplasty.	PHARYNX.	LARYNGO-TRACHEAL.
Specula Oris.	Pharyngeal.	Tracheotomy, Bronchotomy.
Cheek Retractors.	Pharyngoscopic.	
Tongue Depressors and Holders.	Rhinoscopic, Posterior.	RESPIRATORY.
	Naso-Pharyngeal.	Inhaling.
		ALIMENTARY CANAL.
		Œsophageal.

DENTAL.

The Extraction of Teeth.

The extraction of teeth, though not strictly belonging to the province of the medical practitioner, must frequently be performed by him. It is surprising that the operation should receive so little attention ; this neglect can only be accounted for by the too prevailing belief that little or no skill is required for its performance ; but it is the duty of every physician, residing where the services of a skillful dentist cannot always be commanded, to provide himself with proper instruments and become acquainted with the manner of performing this operation.

The forceps are to be preferred to the key, for in a majority of cases they can be used with greater ease and much less pain. Though there are a great variety of forms, but four are required for general use. These are arranged in two sets: one adapted for the incisors, below and above, and the other for the molars and bicuspid, below and above. (See Nos. 36, 46, 3, 23, 42.)

Operate as follows: detach the gum from the neck of the tooth, unless the claw of the forceps is sharp and sufficiently separates it ; grasp the tooth firmly at the alveolar edge, but do not compress the handles of the forceps too tightly ; move the tooth outwards and inwards, in quick succession, until it is loosened, and then draw it from its socket in a line with its normal axis.

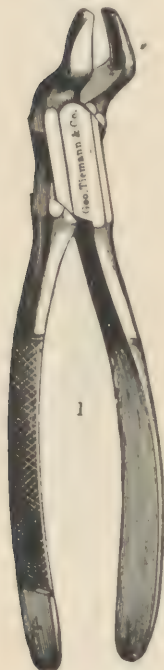
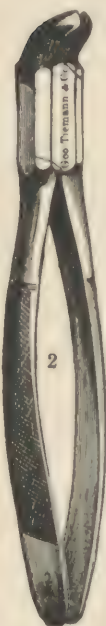
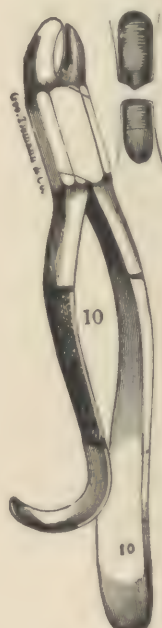
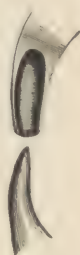
For the incisors, strong, straight forceps may be used, and a slight rotary motion should be given to the tooth ; the cuspids require greater force, due to the length of their roots ; very little rotary motion can be given to the bicuspid ; the upper molars have three roots, are very firm, and must be grasped as high up as possible and pressed out and in until it yields ; the superior dentes sapientiæ are usually less firmly articulated and are easily removed with the bicuspid forceps ; the inferior molars have two roots, but are very firm, and the decayed tooth is liable to be overlapped by the crowns of the adjoining teeth, which may require filing off to admit of removal ; the dentes sapientiæ of the lower jaw, when situated far back, are oftentimes exceedingly difficult to extract, especially when the roots are turned toward the coronoid process ; in this case the loosened tooth should be pushed backward, describing the segment of a circle when it is raised.—"Operative Surgery." Stephen Smith. 1880.

The "key" is now very rarely used. Forceps are constructed of various forms and sizes to adapt them for the extraction of the different teeth ; indeed most dentists employ a special instrument for almost every tooth ; but in general it is sufficient to be furnished with several sizes and forms of straight instruments for extracting the incisors and the cuspids—indeed the same instrument will usually answer for the bicuspid also—and with two or three slightly curved instruments for the molars. (See Nos. 63, 55, 62, 56.)—"Principles and Practice of Surgery." Hamilton.

DENTAL.

EXTRACTION OF TEETH.

Tooth Forceps.

FIG. 2234.
Wisdom.FIG. 2235.
Lower Wisdom.FIG. 2236.
Stump.FIG. 2237.
Upper Bicuspid.FIG. 2238.
Upper Molar.
R.FIG. 2239.
Upper Molar.
L.FIGS. 2240, 2241, 2242.—Upper Molars, Cowhorn.
R. L. Either side.

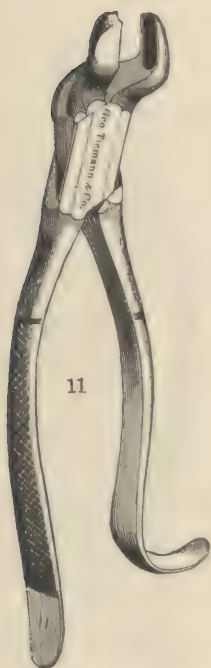
DENTAL.

EXTRACTION OF TEETH.

Tooth Forceps.

FIG. 2244.
Bayonet Upper Molars.

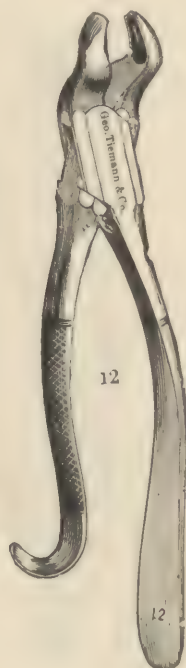
L.



11

FIG. 2245.

R.



12

FIG. 2246.

L.

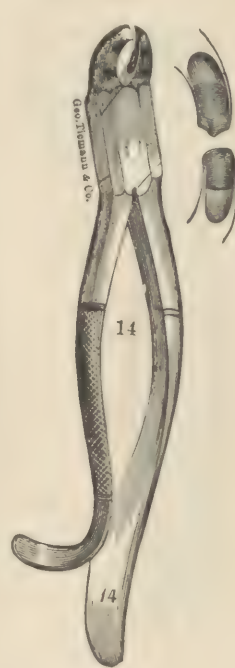


13

13

FIG. 2247.

R.

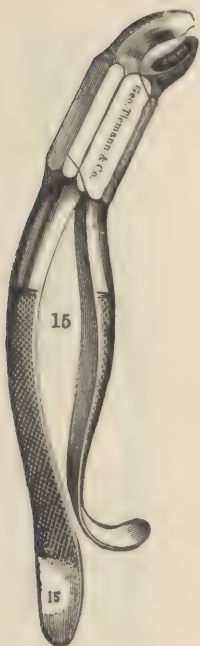


14

14

FIG. 2248.
Harris' Lower Molars.

R.



15

15

FIG. 2249.
Harris' Lower Molars.

L.



16

16

FIG. 2250.
Harris' Lower Molar.

Either Side.



17

17

FIG. 2251.
Cowhorn Lower Molars.

R.



18

18

FIG. 2252.
Cowhorn Lower Molars.

L.



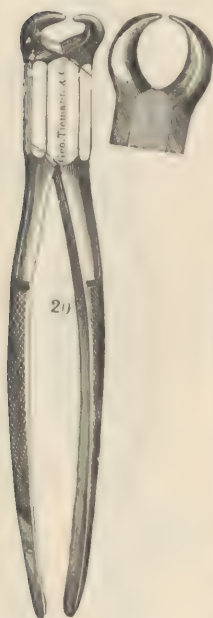
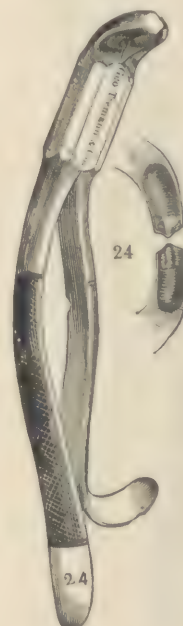
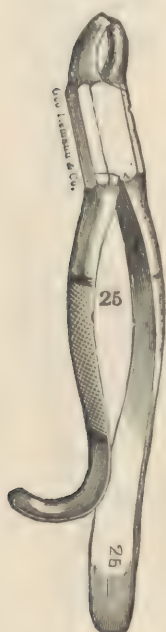
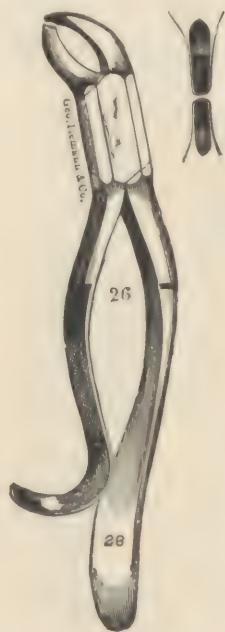
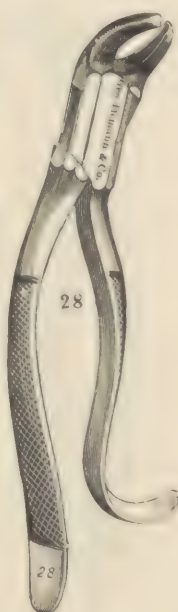
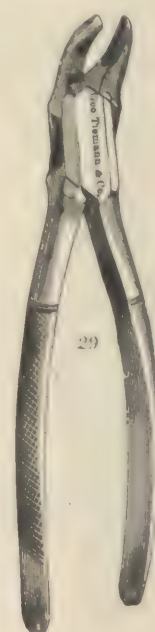
19

19

DENTAL.

EXTRACTION OF TEETH.

Tooth Forceps.

FIG. 2253.
Cowhorn Molar.
Either Side.FIG. 2254.
R.FIG. 2255.
Harris' Lower Molars.
L.FIG. 2256.
Either Side.FIG. 2257.
Wolverton's Lower Molar.
Either Side.FIG. 2258.
Wolverton's
Upper Bicuspid.FIG. 2259.
Wolverton's
Lower Bicuspid.FIG. 2260.
Wolverton's Lower Roots.
R.FIG. 2261.
Wolverton's Lower Roots.
L.FIG. 2262.
Universal Root.

DENTAL.

EXTRACTION OF TEETH.

Tooth Forceps.

FIG. 2263.
Straight Root.

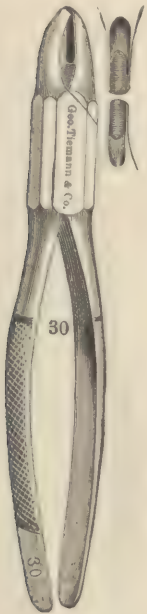


FIG. 2264.
Lower Root.



FIG. 2265.
Straight Root.

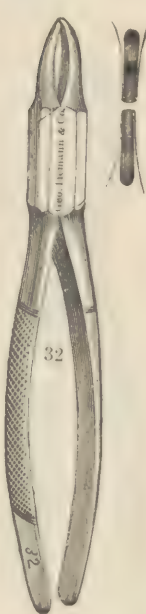


FIG. 2266.
Half Curved Root.

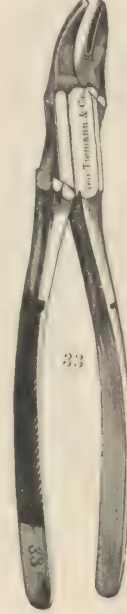


FIG. 2267.
Full Curved Root.



FIG. 2268.
Narrow Beak
Root.

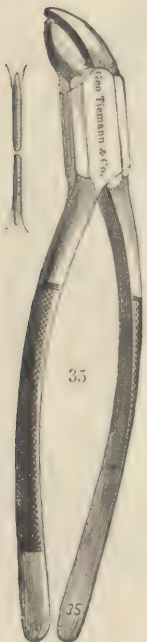


FIG. 2269.
Straight Narrow
Beak Root.



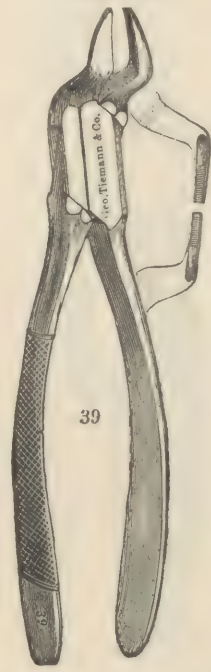
FIG. 2270.
Half Curved Narrow
Beak Root.



FIG. 2271.
Full Curved Narrow
Beak Root.



FIG. 2272.
Bayonet Narrow
Beak Root.



DENTAL.

EXTRACTION OF TEETH.

Tooth Forceps.

FIG. 2273. FIG. 2274.
Narrow Beak Roots.
R. L.

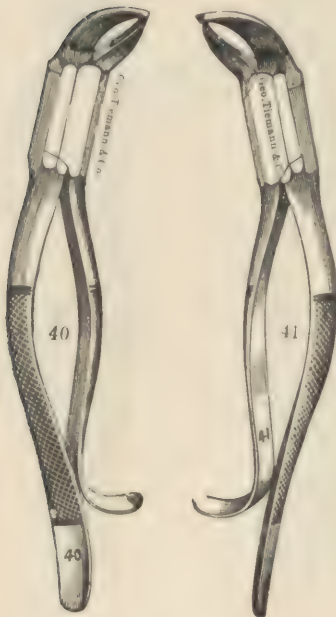


FIG. 2275.
Universal.

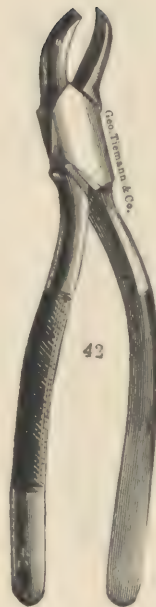


FIG. 2276.
Universal Root.



FIG. 2277.
Parmly's Straight.

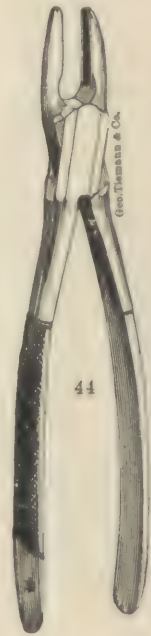


FIG. 2278. FIG. 2279.
Half Curved. Parmly's. Full Curved.

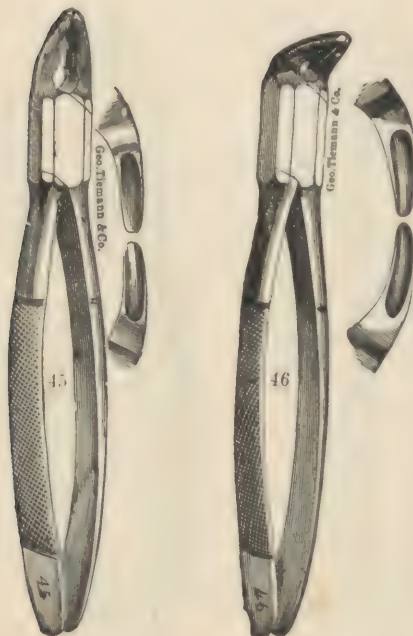
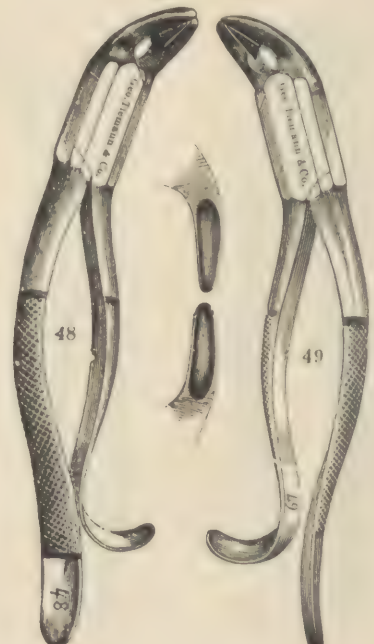


FIG. 2280.
Parmly's Bayonet.



FIG. 2281, 2282.
Parmly's.
L. R.

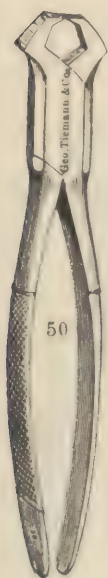


DENTAL.

EXTRACTION OF TEETH.

Tooth Forceps.

FIG. 2283.
Straight.



Excising.

FIG. 2284.
Curved.

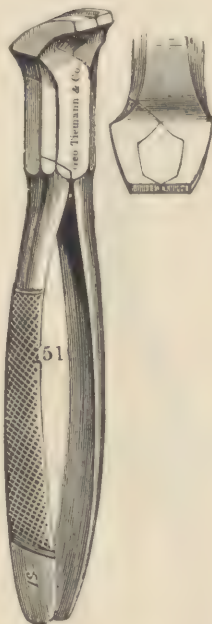


FIG. 2285.
Splitting.



FIG. 2286.
Elevating.



FIG. 2287.
Single Jointed.

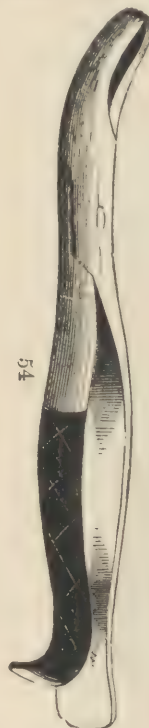


FIG. 2288.
Goodwillie's Upper Molar.

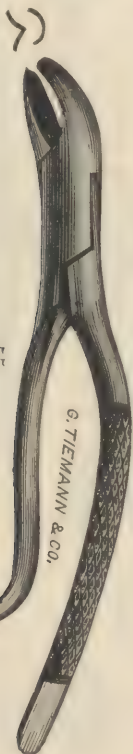


FIG. 2289.
Goodwillie's Spicula.

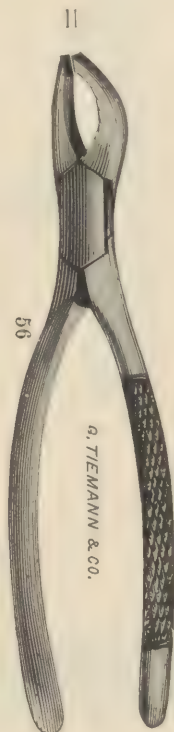


FIG. 2290.
Goodwillie's Root and Children.

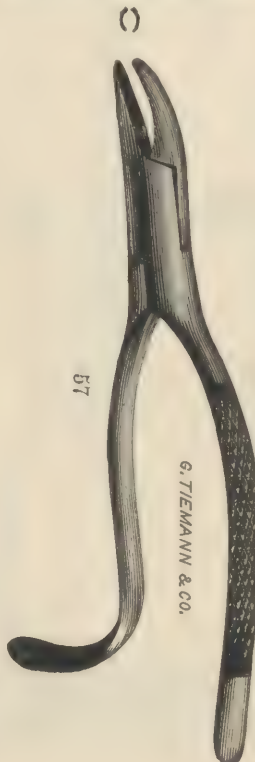
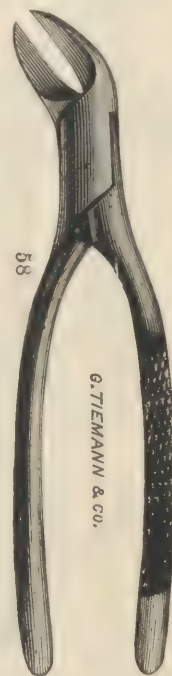


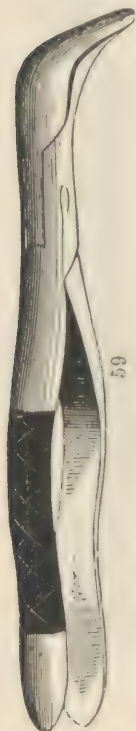
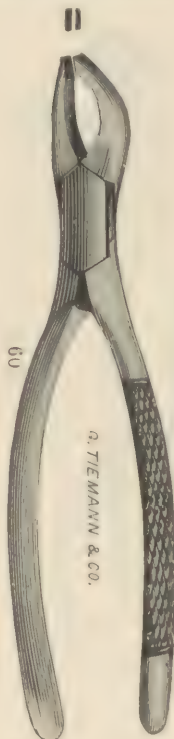
FIG. 2291.
Goodwillie's Splitting.



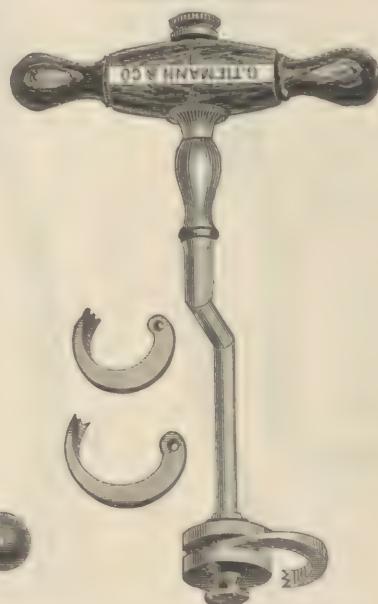
DENTAL.

EXTRACTION OF TEETH.

Tooth Forceps.

FIG. 2292.
Plain Curved.FIG. 2293.
Goodwillie's Bicuspid.FIG. 2294.
Plain Straight.FIG. 2295.
Goodwillie's
Straight.FIG. 2296.
Goodwillie's
Half Curved.

Turn Keys.

FIG. 2297.
Spring Bolt (double).FIG. 2298.
Spring Bolt.FIG. 2299.
Removable Fulcrum.

DENTAL.

EXTRACTION OF TEETH.

Turn Keys.

FIG. 2300.—Rotating Fulcrum.



Root Extractors and Gum Lancets.

FIG. 2301.—Stag-foot Elevator.



FIG. 2302.
Screw Elevator.

FIG. 2303
Root Extractor.

FIG. 2304.
Root Extractor.

FIG. 2305.
Gum Lancet.

FIG. 2306.
Curved
Root Extractor.

FIG. 2307.
Angular
Root Extractor.

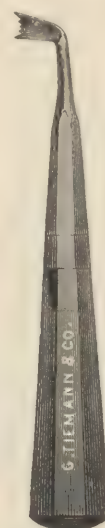


FIG. 2308.—Gum Lancet.



ANTRUM.

ABSCESS OF THE ANTRUM.

The antrum, maxillary sinus, is a large cavity in the body of the superior maxilla, lying above the molar teeth and below the orbital plate, lined in the fresh state by mucous membrane, and communicating with the middle meatus of the nose. The relations of the antrum to the teeth vary extremely; it may extend so as to be in immediate relation to all the teeth of the true maxilla, or may be so contracted as to correspond with only two or three of the central ones. Occasionally a root or roots of the first molar extend into the cavity, free of any bony covering, and merely overlaid by the mucous membrane lining the sinus.

"Before an abscess has formed, and when as yet it is only imminent, remove any carious tooth or teeth in the neighborhood and apply leeches and fomentations. When pus has formed, extract all the carious teeth from the maxilla involved, and, if the pus is discharged from the cavity of either, enlarge the opening sufficiently to give free exit to the pus in the antrum. If there is no carious tooth, proceed as follows: Perforate the antrum by extracting the first permanent molar tooth, and passing a trocar (or trephine, see POPE'S ANTRUM DRILL, page 98, BONE DRILLS, page 109) into the cavity through its socket; the forefinger should be extended on the shaft of the trocar as guard, and the instrument pressed forward with an even rotating motion; avoid the sudden giving away of the wall of the antrum and the plunge of the trocar through the wall of the orbit. If the teeth of the affected side have been long removed, the antrum is more readily perforated at the base of the molar process of the maxillary bone, over the region formerly occupied by the second or third molar tooth, by dividing the mucous membrane and employing a large trocar or a strong pair of scissors. When the antrum is opened wash it out thoroughly with warm water, followed by carbolic acid solutions. The entrance of food must be prevented by plugs of hard rubber, or by a plate fitted to the opening and closed by a cork. It is sometimes practicable to open the passage from the cavity of the antrum to the nasal fossæ with a probe properly directed."—"Operative Surgery." Stephen Smith.

"This entrance is situated above the inferior turbinated bone, almost in the centre of the middle meatus; the sound or probe should be directed upward, backward and outward; about one and a quarter inches from the entrance of the nostril the orifice will be found; slight force may be required to rupture the mucous membrane which covers it. If the natural orifice cannot be found, an artificial one may be made with the *knife*."—"Diseases of the Nose." Wagner. 1884.

HARELIP.

"Harelip, a congenital fissure of the upper lip, on one or both sides, giving to the mouth very much the appearance presented by the cleft upper lip of the hare. It is sometimes accompanied by a fissure of the hard and soft palate, in which the cavities of the mouth and nose communicate. When the teeth and the gums project through the fissure the deformity is much increased. In the infant it interferes with the process of sucking, and in the adult renders speech imperfect; when fissure of the palate co-exists, not only is articulation indistinct and nasal, but the passage of food and drink from the mouth to the nose, and of the nasal secretions into the mouth, is a source of great annoyance and mortification. This deformity is in most cases capable of removal by a very simple surgical operation,

which has been practised successfully upon infants a few weeks old. The operation consists merely in paring the edges of the fissure with a knife or scissors, and keeping the cut surfaces in apposition by needles and sutures, strengthened by sticking plaster or collodion. When the harelip is double, both sides are generally operated on at the same time. It is usual to extract projecting teeth, or to remove any too prominent portion of the jaw by cutting forceps. Bleeding is generally slight, and restrained by pressure or simple contact of the cut surfaces. In infants, adhesive straps are often necessary to prevent the edges being drawn asunder by crying or sucking; in adults, strict silence and liquid food are enjoined for four or five days.

"Fissure of the soft palate is remedied on the same principle of paring the edges and keeping them in contact by various kinds of sutures and needles; this operation, called *staphyloraphy*, can only be performed on a patient old enough to aid the proceedings of the surgeon."—"American Cyclopædia."

"When the chasm is uncommonly large, as when the intervening substance has been removed, the tension of the parts may be so great as to require support. A most admirable contrivance for this purpose, sketched in Fig. 2309, has been devised by Mr. Hainsby, and is so arranged as to press each cheek over toward the middle line."—"System of Surgery." Gross.

FIG. 2309.

Hainsby's Cheek Compressor or Truss.



HARELIP.

Clamps and Forceps for holding the Lips, Scalpels and Scissors for paring the Edges of the Cleft, and Pins to preserve them in contact in order to cause adhesion.

FIG. 2310.
Hutchison's Harelip Forceps.

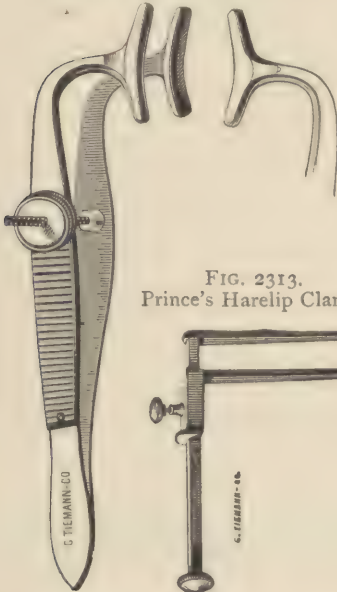


FIG. 2311.—Parallel Harelip Forceps.

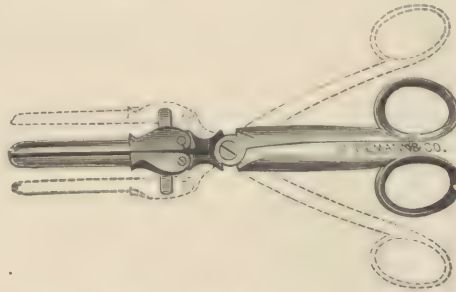


FIG. 2312.
Whitson's Harelip Clamp.

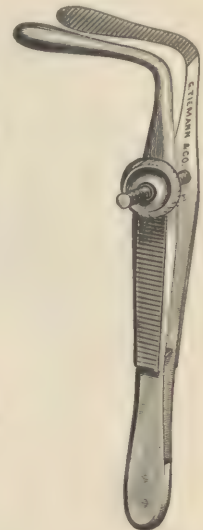
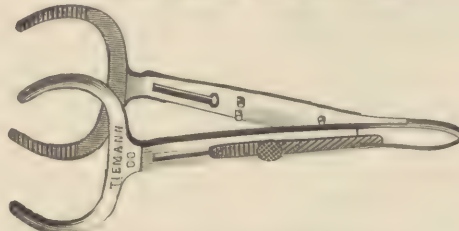


FIG. 2313.
Prince's Harelip Clamp.

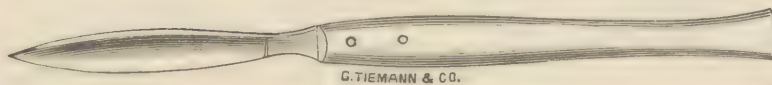


FIG. 2314.—Smith's Harelip Forceps.



See "HAINSBY'S CHEEK COMPRESSOR."

FIG. 2315.—Scalpel.



G. TIEMANN & CO.

FIG. 2316.—Buck's Pin Conductor.



G. TIEMANN & CO. N.Y.

FIG. 2317.—Post's Pin Conductor.

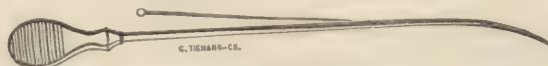
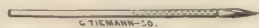


FIG. 2318.—Plastic Pin.



FIG. 2319.—Silver Harelip Pin,
with Removable Steel Point.



G. TIEMANN & CO.

FIG. 2320.—Hamilton's Harelip Scissors, Heavy.

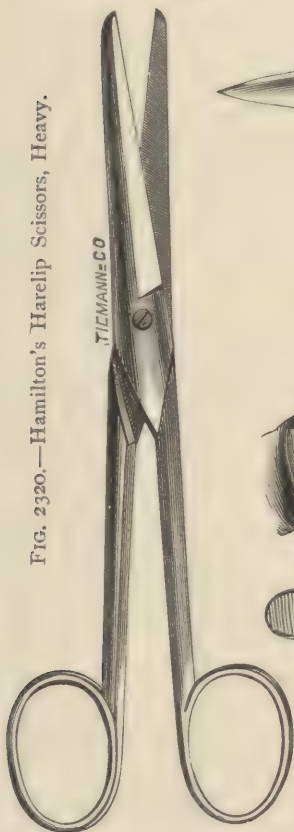


FIG. 2321.—Harelip Scissors Angular.



STAPHYLOGRAPHY.

The Operation for Uniting a Cleft Palate.

It consists in paring the edges of the cleft, passing ligatures through them and bringing them together.—DUNGLISON.

FIG. 2322.—Whitehead's Mouth Gag (*in situ*).



FIG. 2323.—Whitehead's Mouth Gag.

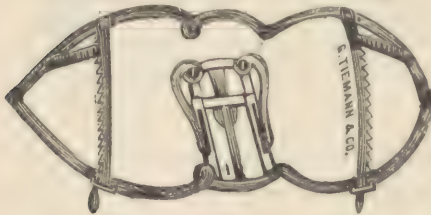


FIG. 2324.—Whitehead's Seizing Forceps.

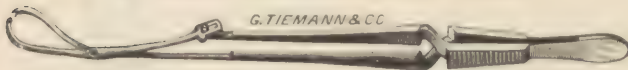


FIG. 2325.—Seizing Forceps.



FIG. 2326.—Langenbeck's Seizing Forceps.



FIG. 2327.—Durham's Seizing Forceps.



FIG. 2328.—Curved Scissors, for Dividing the Muscles.



Fig. 2322 represents a mouth speculum used by Dr. Whitehead. It is serviceable in many operations about the mouth and throat, but particularly well suited to the operation for cleft palate, while the patient is under the influence of ether. This speculum is provided with a sliding tongue depressor, which adapts it to different patients, and has two stout ratchets, kept in position by a spiral spring or slightly curved piece of steel, which presses on the upper end of the ratchet. It is sometimes necessary to wrap a piece of soft yarn around the part of the wire which presses on the gum. The speculum or gag is nickel plated, to protect it from rust and injury by acids.

Fig. 2323 shows a later improvement, by which the tongue depressor can be not only depressed or elevated, lengthened or shortened, but it can also be made narrower or wider, at will, by means of a peculiar adjustment shown in the figure.

Figs. 2324 to 2327 illustrate forceps with which the palatopharyngeus and palato-glossus muscles may be seized, previous to their division, with long curved scissors, such as represented by Fig. 2328. These forceps embrace the muscle and do not permit it to escape.

Fig. 2329 represents knives useful for cutting the levator palati muscles and for dividing, at the same time, the rather thick mucoperiosteal membrane lining the lower part of the internal pterygoid plate. These knives are also used for paring the edges of a cleft palate.

Fig. 2330 shows Sims' tenaculum, which is useful for pulling the velum aside, holding the edges of the flaps, catching the thread used for passing silver wire, also for holding the wire in approximating the edges and for other purposes.

Richardson's Spray Instrument, with an extra tube, and half a dozen sponge holders with small pieces of sponge securely fastened to them, are necessary to clear the throat of blood.

FIG. 2329.—Whitehead's Knives, for Paring the Edges.

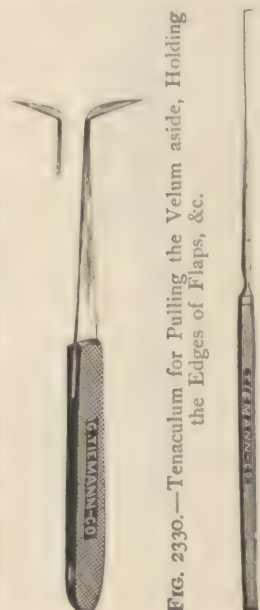


FIG. 2330.—Tenaculum for Pulling the Velum aside, Holding the Edges of Flaps, &c.

STAPHYLOGRAPHY.

UNITING CLEFT PALATE.

FIG. 2331.—Whitehead's Gum Knife.



recall to mind the peculiar distribution of the arteries of the roof of the mouth: At the junction of the horizontal plates of the maxilla and palate bones with the alveolar process, there is a groove in which courses the superior palatine artery. This artery, which is of considerable size, emerges from the orifice of the posterior palatine canal, and after running along the groove ascends through the anterior palatine canal, anastomosing with its congener and the naso-palatine. Some small branches, which emerge from the accessory palatine canals, contribute to nourish the velum. The proper distribution of the incisions, and the protection of the arteries from injury, insure the nutrition of the muco-periosteal tissues, with which a cleft in the hard palate is closed by sliding them together at the middle line. By closing the cleft in the hard palate, there is, below the age of twenty, a fair prospect of having a formation of new bone which closes the deformity in the palatine vault. This has been observed in some of Dr. Whitehead's cases.

FIG. 2332.—Whitehead's Hoe, for Dividing Muco-Periosteal Membrane.



FIG. 2333.—Sayre's Periosteotome.



The needle holder which Roux used for staphyloraphy was a good instrument, but, as attention began to be directed to cleft palate, one of the apparently most difficult steps of the operation was the passage of the sutures. Numerous instruments were devised, and the instrument of Depierris was probably the most ingenious ever conceived. It is said to have given the idea of the sewing machine, and indeed one can readily believe such to have been the case on inspecting the instrument. The difficulties of passing the sutures are not so great as some might suppose, and so complicated an instrument as that used by Depierris is not required. Standing in front of the patient is not the easiest way to pass the sutures.

There are a number of little simple details which make up the success of many operations generally considered difficult; the position of the patient and the attitude of the operator, the substitution of a simple instrument for a complicated piece of mechanism and a simple manner of using it.

FIG. 2334.—Whitehead's Spiral Needle, for Sutures.



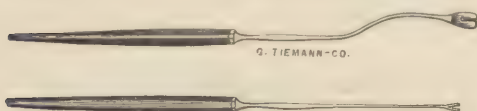
FIG. 2335.—Sims' Adjuster. (For Wire Sutures.)



FIG. 2336.—Sims' Tenaculum.



FIGS. 2337, 2338.—Sims' Adjuster and Pulley.



The instrument shown in Fig. 2331 is designed for making deep cuts through the muco-periosteal tissue of the gum and along the side of the teeth. When it is necessary to close a cleft of the hard palate at the same time that staphyloraphy is required, and such is most frequently the case, it would be well to

This instrument (Fig. 2332), shaped like a hoe and having a cutting edge, is useful in dividing the muco-periosteal membrane along the edges of a cleft of the hard palate, and also for dividing the tendinous insertion of the palate muscles along the posterior border of the cleft palate bones.

Fig. 2333 represents Dr. L. A. Sayre's instrument for detaching the periosteum in operations about the hip-joint and elsewhere, and is a capital instrument for detaching the muco-periosteal membrane in an operation for cleft palate. This is a heavy, solid steel instrument, resembling somewhat an oyster knife, and is represented half size.

Fig. 2334 represents an excellent needle. It is spiral and has an eye near the point, and when used the operator should stand behind the patient, and bending over him pass the sutures from right to left, the thread being looped and the two free ends hanging out of the eye on the convex side. When the point of the needle has transpierced the left flap, Dr. Sims' tenaculum, represented in Fig. 2336, is used to pull out the two free

ends of the thread. The needle is then disengaged, and silver wire drawn through on the looped thread. A spiral *canulated* needle of the same shape may be used by those who prefer it, with either silver wire or horse hair. But Fig. 2334 is stronger and preferred by Dr. Whitehead, who uses three different sizes.

Figs. 2335, 2337 and 2338 are instruments used by Dr. Sims, for twisting silver wire in the operation for vesico-vaginal fistula, and are useful in the operation for cleft palate.

STAPHYLOGRAPHY.

UNITING CLEFT PALATE.

A whalebone probe is required for stuffing into the side cuts bits of cotton, which keep them from healing too soon, and press the edges of the flaps together. A small pair of forceps for removing the cotton from the side cuts will also be found serviceable.

Buck's needle, for passing harelip pins (Fig. 2316), on account of the frequency of harelip attending cleft palate, will appropriately find a place in this case. A pair of stout straight scissors, about the size of those generally con-

tained in a pocket case, might be added. They will be found useful in cutting thread and wire, and in the operation for harelip in thoroughly detaching the lip from the gum. This is a precaution that the late Dr. Buck insisted upon in operations on the lips; and

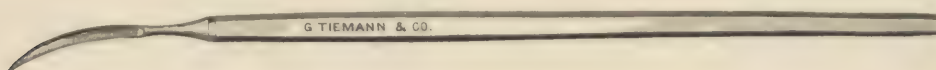
FIG. 2339.—Sims' Wire-Twisting Forceps.



G. TIEMANN & CO.

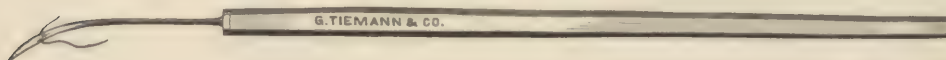
it is an excellent rule to use soft cotton yarn for twisting around the pins, instead of thread. The yarn soaks up the water readily and may be renewed each day, and thus relieve a certain degree of strangulation of the parts, which otherwise would be too long continued. A narrow sharp-pointed bistoury, for paring the edges of a cleft lip, should be contained in this case.—WHITEHEAD.

FIG. 2340.—Curved Bistoury.



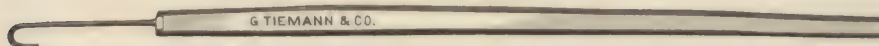
G. TIEMANN & CO.

FIG. 2341.—Curved Needle.



G. TIEMANN & CO.

FIG. 2342.—Blunt Hook.



G. TIEMANN & CO.

FIG. 2343.—Bent Needle.



G. TIEMANN & CO.

UP DE GRAFF'S STAPHYLOGRAPHY SET.—The edges of the cleft are freshened with the bistoury (Fig. 2340). The curved needle (Fig. 2341) is threaded with waxed Chinese silk and thrust through one edge of cleft, then slightly withdrawn, so as to form a loop underneath. The blunt hook (Fig. 2342) is passed through this loop, by means of which the thread is withdrawn outside the mouth, and the needle is also withdrawn. The bent needle (Fig. 2343) is then threaded with the same thread and pushed from the rear (of the opposite side of cleft) to the front; a loop is formed in same manner as with curved needle, and thread withdrawn with the blunt hook. The process is repeated until as many sutures are introduced as seem necessary, all of which are tied.

FIG. 2344.—Double-edged Staphyloraphy Knife.



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FIG. 2345.—Staphyloraphy Knife, Curved Right or Left.



G. TIEMANN & CO.

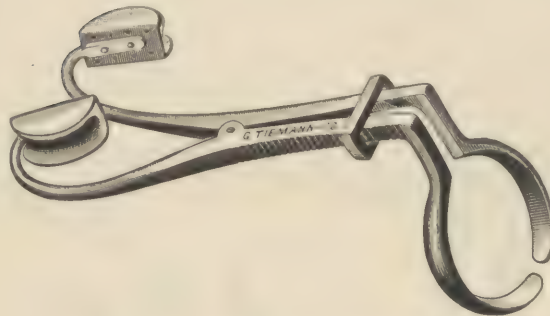
STAPHYLOGRAPHY.

UNITING CLEFT PALATE.

FIG. 2346.—Goodwillie's Canulated Staphyloraphy Needle, for Silkworm Gut.



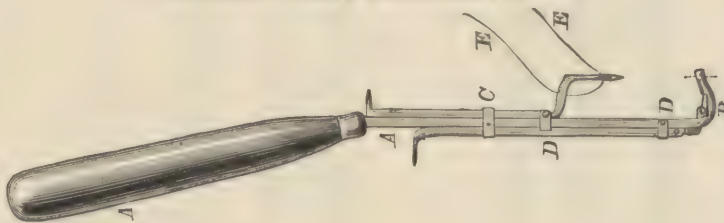
FIG. 2347.—Goodwillie's Mouth Gag.



FIGS. 2349, 2350, 2351. Goodwillie's Staphyloraphy Knives.



FIG. 2348.—Prince's Staphyloraphy Needle.



AA. Shaft and handle.

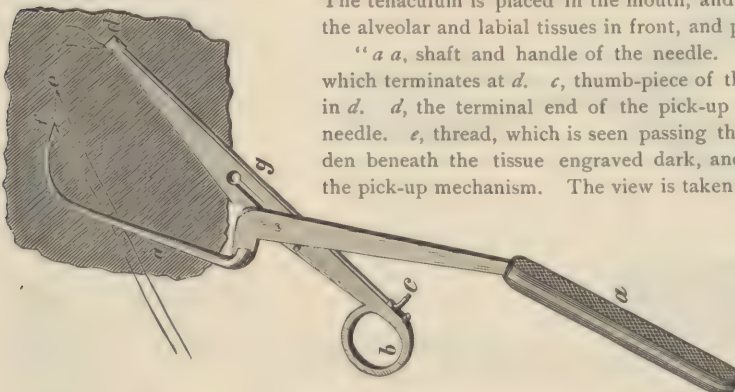
B. Foot-piece of the shaft, curved. Its extreme point has an orifice, the place of which is indicated by the dotted line. The orifice is entered by the needle, *C*, carrying the thread, *EE*.

C. Needle with a thumb-piece.

DD. Pick-up pin, with a thumb-piece above its sliding shaft and its fine point above the *B*. As the shaft (upper *D*) goes down, the pin (lower *D*) moves horizontally and at a right angle to its shaft, and picks up the thread carried by the needle, *C*.

EE. Thread carried by the needle, *C*, and picked by the stiletto or pin indicated by *D*. This is retained while the needle is withdrawn, so that, on displacing the shaft, *AA*, with its foot-piece, *B*, the thread is exposed and can be seized by a tenaculum or by the fingers.

FIG. 2352.—Prince's Tenaculum Needle.



"A needle in the form of a tenaculum (the eye being near the point), to which Black's pick-up attachment is applied, greatly facilitates the introduction of sutures. The tenaculum is placed in the mouth, and the pick-up shaft in the nose, striding the alveolar and labial tissues in front, and picking up the stitches in the dark.

"*a*, shaft and handle of the needle. *b*, the finger end of the pick-up shaft, which terminates at *d*. *c*, thumb-piece of the pick-up stilette, the point of which is in *d*. *d*, the terminal end of the pick-up shaft, which receives the point of the needle. *e*, thread, which is seen passing through the eye of the needle, then hidden beneath the tissue engraved dark, and again emerging to be connected with the pick-up mechanism. The view is taken at the time when the pick-up stilette is ready to let go its hold. *f*, point of the needle perforated for the passage of the suture thread. *g*, slot in the pick-up shaft to enable it to be drawn out of the way and detached."—"Palato-Plasty. David Prince, M.D. American Practitioner, March, 1876."

STAPHYLOGRAPHY.

URANISCOPLASTY.

The operation of engrafting in case of deficiency of the soft palate.—DUNGLISON.

Clefts in the hard palate are treated upon the same principles as those of the soft palate, by a process originally suggested by Von Langenbeck and since variously modified by different surgeons. It consists in dividing the maxillary and palate bones on each side close to the alveolar border, so as to form two osseous flaps, which are then pressed over to the middle line, where they are united in the usual manner—the edges having been previously pared, along with those of the soft palate, from behind forward, so as to admit of the operation being finished at one sitting.—“System of Surgery.” S. D. Gross.

FIG. 2353.
Langenbeck's
Retractor.



FIGS. 2354, 2355, 2356.
Langenbeck's Double
Edge Knives.



FIGS. 2357, 2358, 2359, 2360.
Langenbeck's Convex and Con-
cave Knives and Tenaculum.

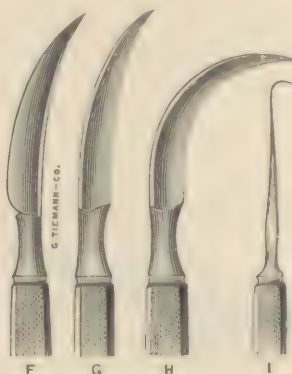


FIG. 2361.
Langenbeck's
Suture Holder.



SPECULA ORIS.

CHEEK RETRACTORS.

For holding back and protecting the Cheeks against injury in Operations on the Upper and Lower Jaws.

FIG. 2362.—Cheek Retractor.

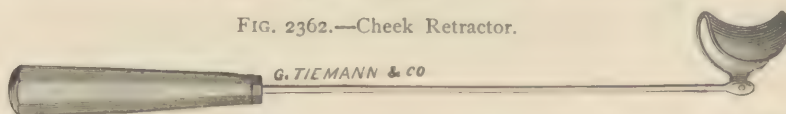


FIG. 2363.
Right Cheek Retractor.



FIG. 2364.—Luer's Cheek Retractor.

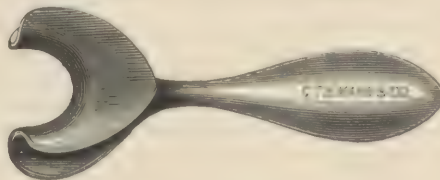


FIG. 2365.
Left Cheek Retractor.



FIG. 2366.
Roe's Mouth Gag and Cheek Retractor.



See OSTEOTOMY INSTRUMENTS, page 102, &c., and
ANTRUM DRILL, page 98.

SPECULA ORIS.

MOUTH GAGS.

Gags for keeping the Jaws apart during Operations in the Mouth, Pharynx, Larynx, Trachea and Œsophagus, and Specula Oris for breaking up Morbid Adhesions and Lockjaw.

FIG. 2367.

Allingham's Annandales' Mouth Gag.

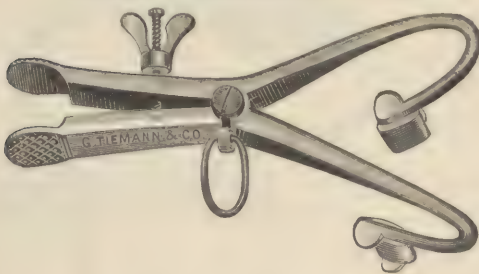


FIG. 2368.—Goodwillie's Speculum Oris, for Reducing Lockjaw.

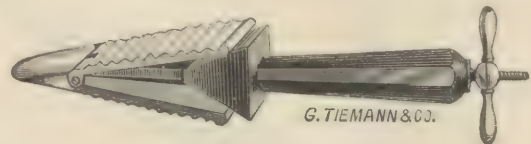


FIG. 2369.—Mussey's Mouth Gag.

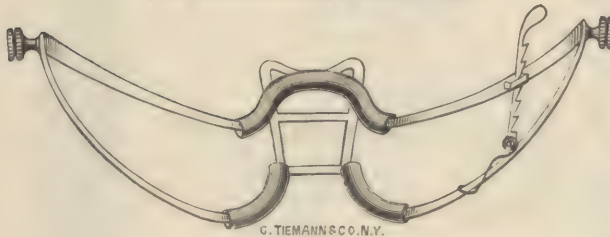


FIG. 2370.—Parker's Mouth Gag.

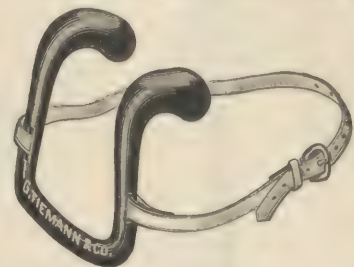


FIG. 2371.—Weir's Mouth Gag.

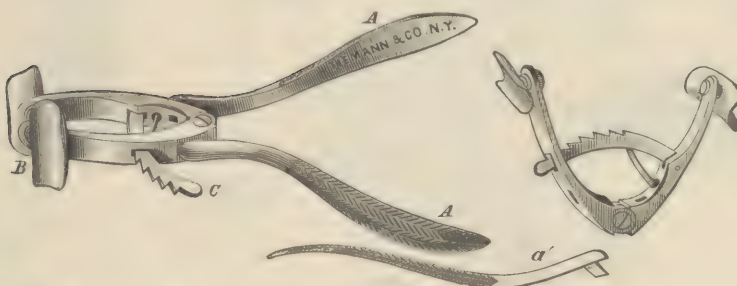


FIG. 2372. Goodwillie's Elastic Mouth Gag.



FIG. 2375. Westmoreland's Speculum Oris, for Reducing Lockjaw.

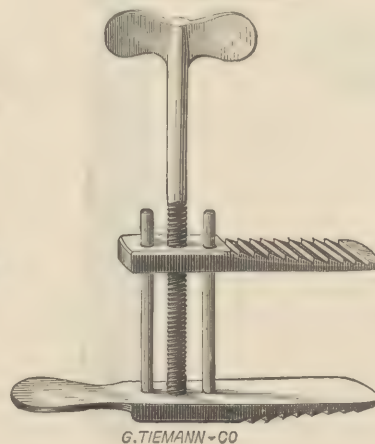


FIG. 2374. Clover's Mouth Gag.



FIG. 2373.—Mott's Heister's Speculum Oris.

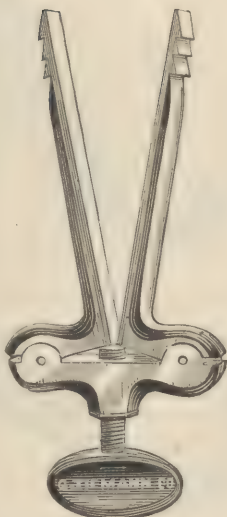
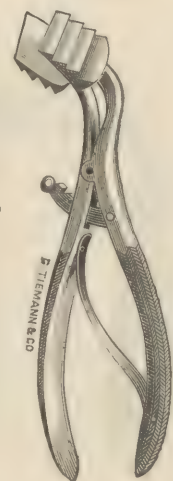


FIG. 2376.—Gross' Speculum Oris.



SPECULA ORIS.

TONGUE DEPRESSORS.

For increasing the space between the Tongue and the Velum, for the passage and manipulation of Pharyngeal and Laryngeal Instruments.

FIG. 2377.
Rumbold's
Tongue Depressor.



FIG. 2378.—Green's Folding Tongue Depressor.

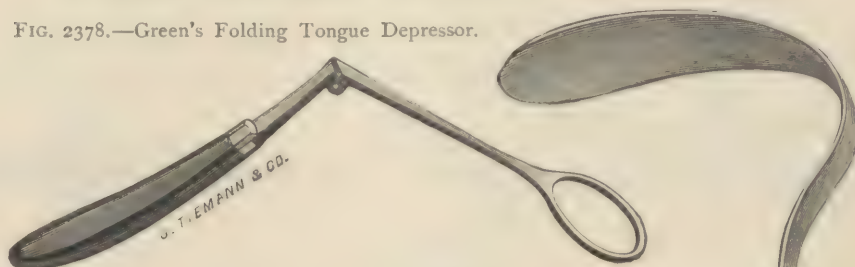


FIG. 2379.—Goodwillie's Tongue Depressor.

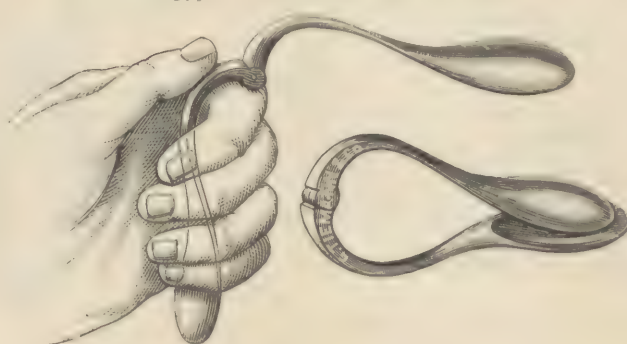


FIG. 2380.—Sass' Tongue Depressor.



FIG. 2383.
Steel Folding Tongue Depressor.



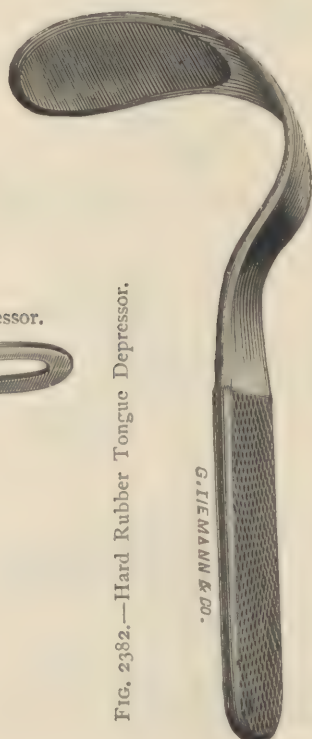
FIG. 2384.—Folding Tongue Depressor.



FIG. 2381.
Bosworth's Tongue Depressor.



FIG. 2382.—Hard Rubber Tongue Depressor.



SPECULUM ORIS.

TONGUE DEPRESSORS.

For increasing the space between the Tongue and the Velum, for the passage and manipulation of Pharyngeal and Laryngeal Instruments.

FIG. 2385.
Pocket Tongue Depressor.



FIG. 2387.
Türk's Tongue Depressor,
(3 blades).

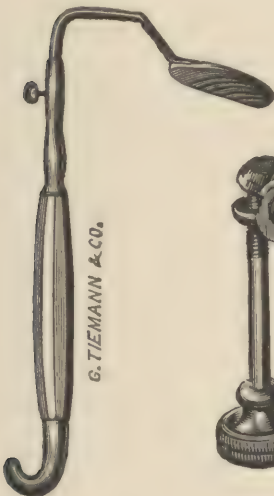


FIG. 2388.—Church's Tongue Depressor.

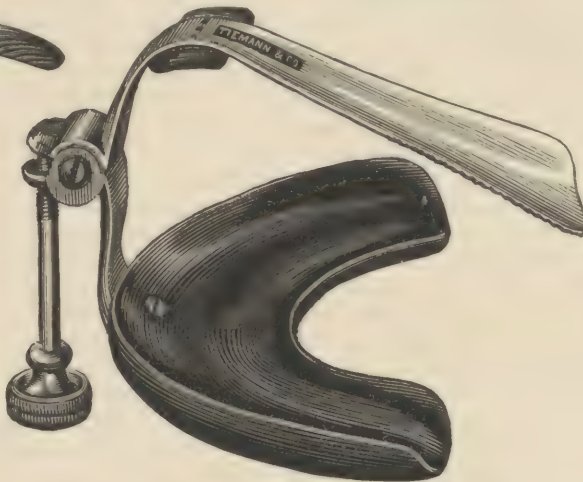


FIG. 2386.—Elsberg's Tongue Depressor.

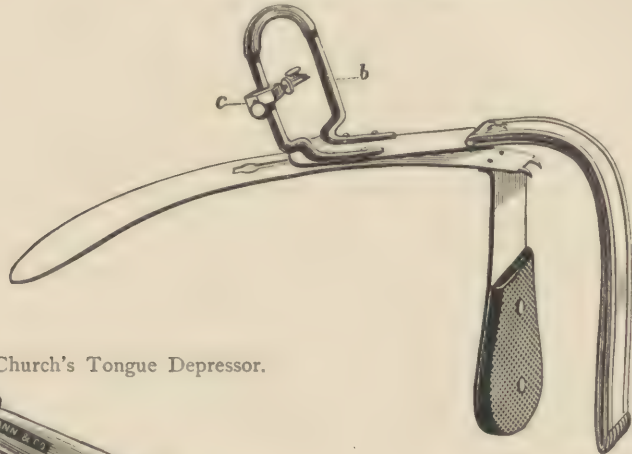


FIG. 2389.—Dobell's
Tongue-holding
Forceps.

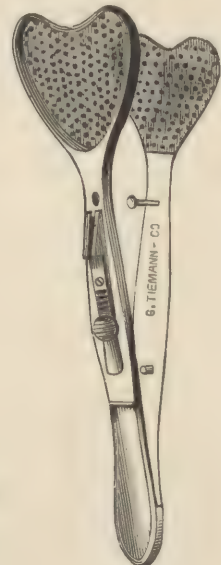
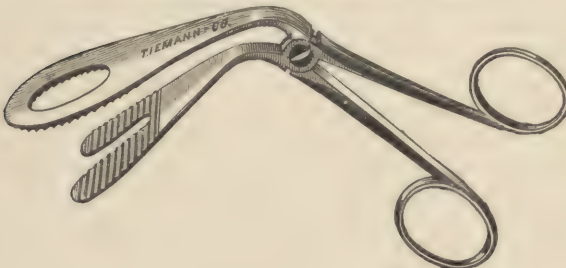


FIG. 2390.—Cusco's Tongue-Holding Forceps.



FIGS. 2389 and 2390
are used to steady the tongue
when operating
for tumors, excision, &c.

Tongue Depressors.

"Take care that the blade of the instrument be not introduced beyond two-thirds of the length of the dorsum of the tongue, as otherwise retching will ensue. No more pressure should be exerted with it than suffices to expose the pharyngeal wall. In this way the whole region will be much more satisfactorily exposed than will be the case if the patient be allowed to 'show his throat' by his own intuitive method, which implies strain on all the muscles of the part."—"Examination through the Mouth." "Woakes on Post-Nasal Catarrh," page 94. 1884.

TONSILLAR.

Anatomy and Physiology of the Tonsils, Uvula and Soft Palate.

On looking into the mouth, we observe, at its posterior part, the contraction which, under the name of the *isthmus faucium*, constitutes the line of division between the oral cavity and the bag of the pharynx and posterior nares. It is formed, above, by the uvula and edge of the soft palate; below, by the base of the tongue; and laterally, by the two arches of the palate, each of which arises from the base of the uvula and passes downwards and outwards—the anterior diverging from the posterior in the descent, so that when they are seen at the side of the fauces on a level with the dorsum of the tongue they are about three-fourths of an inch asunder. Below this point they proceed, one to be inserted into the side of the tongue, the other into the pharynx at about its middle. In the sulcus formed by the divergence of the anterior and posterior arches, is situated the *tonsil*, which, when the parts are in a state of rest, is scarcely to be seen, the substance of the gland being hidden by the anterior arch; but, when this is not too strongly developed, the convex surface of the gland sometimes becomes visible.

The *tonsils*, or, as they are not unusually called, the *amigdalæ*, from their resemblance to the almond shape and size, are glandular bodies, secreting a mucous fluid from a considerable number of openings on their external surface, which is pressed out in great abundance upon the food, on its passage through the *isthmus faucium* into the throat. This process is effected by the joint action of the various muscles, more especially by the palato-glossus and palato-pharyngeus, which form the arches between which the tonsils are situated. The openings upon the surface of the tonsil are sometimes so large as to give it a cellular appearance; occasionally, also, it presents a lobulated or tuberculated exterior, especially when enlarged by disease.

The *uvula* is the conically-shaped body which hangs from the centre of the loose edge of the palate into the pharynx. At its origin it is broad and rather flattened, becoming rounded in its descent, until it terminates in an obtuse point. It varies considerably in length; sometimes it may be seen, to all appearance, inconveniently long, and sometimes so little developed as to leave it doubtful whether an uvula exists. In its natural state it is said to point to the foramen cæcum of the tongue; but this is giving it credit for an independent muscular development which it does not in reality possess. The uvula must be considered as little more than a prolongation of the mucous membrane which lines the whole of the throat, mouth, nose, &c. It is only found in man and the monkey tribe. In other animals the loose edge of the palate, instead of being formed into arches by this central appendage, is found almost straight.

The *soft palate*, *velum pendulum palati*, or, *palatum molle*, is described as a movable and flexible curtain, extending from the back of the palatine arch into the pharynx, of nearly a quadrangular figure, with an anterior and posterior surface and four margins—one superior, one inferior and two lateral; the anterior surface concave, presenting downwards and forwards and studded with numerous mucous ducts; the posterior surface directed upwards and backwards and elevated at its sides. At the lateral margins of the soft palate commence the muscular folds, which constitute the palato-glossus and palato-pharyngeus muscles. The superior margin is attached to the posterior edge of the ossa-palati, and the inferior hangs loosely into the pharynx, formed into arches by the pendulous uvula which arises from its centre.

The arches, velum palati, and uvula are chiefly composed of muscular fibres, covered by mucous membrane, which is everywhere studded with follicles; the dorsum of the tongue also, at its posterior part, is furnished with numerous mucous glands, which give it the rough and tuberculated appearance it presents on looking into the mouth.

The muscles of the soft palate are: the levator palati, the circumflexus palati and the azygos uvulæ. The palato-glossus, passing down from the uvula to the side of the tongue, and constituting the *anterior arch*, assists above to form the soft palate. In like manner the palato-pharyngeus, passing from the uvula to the side of the pharynx, also contributes above to form the soft palate. These two last-mentioned muscles embrace the tonsil between them in the irregular triangular space or sulcus, in the manner already mentioned. The pain in deglutition which is experienced by persons with inflamed tonsils, arises from the pressure of the palato-glossus and palato-pharyngeus muscles on these glands.

These various parts are supplied with blood from the following sources: the soft palate and uvula chiefly from the inferior palatine branch of the facial artery; the tonsils from a twig of the facial, called, therefore, the tonsillary branch, and from another arising from the pharyngeal branch of the ascending pharyngeal. The carotid artery is situated considerably behind the tonsil, and, when the gland is drawn out by a tenaculum from its place between the arches, the artery will be more than an inch distant. The nutrient vessels of the tonsils and adjacent mucous membrane are all of them exceedingly minute; when cut they speedily contract, so that no hæmorrhage of consequence ever ensues on their division. The nervous ramusculi which supply the soft palate and the tonsils are: one of the small terminal branches of the glosso-pharyngeal nerve; a minute filament of the great palatine nerve, which passes through an osseous foramen in the nasal plate of the palate bone and enters the tonsil; and, lastly, the middle palatine nerve, which penetrates the soft palate by the canal in front of the pterygoid hook, and is distributed to the soft palate and the amygdalæ. The various filaments thus derived form an interlacement around the tonsil, termed the *plexus tonsillaris*; their ultimate distribution is chiefly to the neighboring mucous surfaces; so few fibres enter the tonsil itself that it possesses a very low degree of sensibility.

Use of the Tonsils.—The tonsils have been supposed most erroneously to give tone to the voice. There can be no doubt that the principal use of the tonsils is to facilitate deglutition by the lubrication of the morsel of food with their

TONSILLAR.

Anatomy and Physiology of the Tonsils, Uvula and Soft Palate. (Continued.)

abundant mucous secretion in its passage into the throat. The mucous follicles, or lacunæ of the tonsils, retain their secretion till the act of deglutition takes place; it is then squeezed out by the approximation of the arches on each side of the throat and received by the morsel of food with which this action brings them in contact. This appears to be the only function of the tonsillary secretion; it possesses no other properties than those of ordinary mucus, and cannot, therefore, like the salivary, be supposed to have any share in the process of digestion. The food is still further lubricated in its passage into the pharynx by a supply of mucus from the small glands with which the surrounding parts are studded, including the palate, the uvula and the base of the tongue.

Use of the Soft Palate and Uvula.—During the act of deglutition, vomiting or holding the breath, it has been shown by Dzondi that, by the approximation of the posterior arches from side to side, the lower parts of the pharynx and the cavity of the mouth may be almost entirely cut off from the posterior nares. It is this action, and not the mere raising of the palate, which enables us to swallow without regurgitation into the nose, or to vomit without allowing the matter to escape by the nose, or to perform the act of breathing through the mouth alone, when we wish to defend the olfactory organ from unpleasant odors. When the palatine arches thus act, the uvula lies passive between them, and contributes in some degree to complete the division between the nares and the pharynx. It cannot, however, be of any great importance in this particular, as this appendage is only present in man and the quadrumana. In singing, the uvula and palate are raised during the production of the higher notes, and it is a singular fact that, when the uvula is removed and the soft palate in consequence more easily raised, the voice, in singing, can attain a greater altitude; oftentimes two full notes in the musical scale are gained, without any deterioration or loss of the lower notes. That the uvula is of no importance in the production of the voice or speech is proved by the fact that many cases are recorded in which it had been destroyed by disease, or when there had been congenital deficiency; in none of these cases, when the soft palate had been left intact; had anything abnormal been observed in the voice. Neither does the loss of the uvula, as far as my experience goes, interfere in the least with deglutition; the contraction of the palatine arches and guidance of the food into the pharynx take place with as much precision as before.

This brief sketch of the anatomy and physiology of the tonsils, uvula and soft palate would be very incomplete without adverting more particularly to the important membrane by which these and all the surrounding parts are covered. Commencing at the mouth, at the junction of the skin with the red tissue of the lips, it passes inwards to line the mouth and enters into all the salivary glands, giving off delicate prolongations to the different nasal cavities, the cells and sinuses in the upper jaw, os frontis, and the other bones of the cranium and face which are subservient to the senses of hearing and smell. In the pharynx it becomes continuous with the mucous lining of the eustachian tubes, and through them enters the tympanum as its investing membrane, covering the small membranes which close the inner ear, and also the external membrane of the drum; finally, this part of the membrane spreads itself out on the surface of the mastoid cells, behind the organ of hearing. Passing downwards from the throat, its track admits of two important divisions; the one, entering at the glottis, runs down the trachea and bronchial tubes, dividing and subdividing to an infinite extent, to line these innumerable cells in which the vital properties of the air become imparted to the blood as it flows through the lungs; the other division, or the intestinal mucous membrane, continues down the gullet to the stomach, contributing greatly to the rugæ of that organ, and becomes the seat of the secretion of the gastric juice, the bile, pancreatic fluid and the multitude of minor glands with which the intestinal tube is everywhere studded; finally, it terminates at the anus, where it again becomes identified with common integument.

On considering the immense extent of this continuous mucous surface, its ramifications throughout cells, tubes, canals, reduplications and convolutions in an almost infinite variety of arrangement and form, the principle of sympathy between one organ and another may be readily understood; and a valuable guide this principle is to us in the treatment of disease.—“Yearsley on the Throat.” London. 7th edition. 1859.

Nature of the Changes produced in the Tonsils and Uvula.

The chronic disease of the tonsils usually met with cannot be strictly termed *hypertrophy*, which signifies an increased nutrition of the parts, inasmuch as the augmented size does not consist of the proper glandular substance, but of deposits of fibrin, which are gradually thrown out during the inflammation or irritation to which they are subject, and in process of time become organized. This organization takes place only to a limited extent, as they never possess much sensibility, when of the largest size, unless acutely inflamed; and they receive so small a supply of blood in their enlarged state that, even when cut into, little or no hæmorrhage takes place.—YEARSLEY.

Scarification of Enlarged Tonsils in a state of active inflammation.

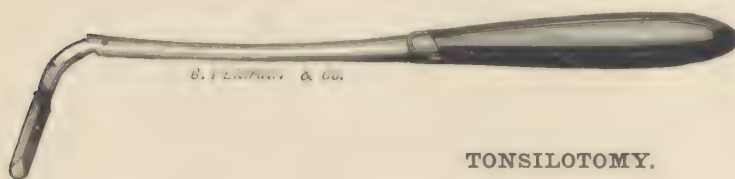
When enlarged tonsils are in the first stage of active inflammation, nothing is so immediately efficacious as *scarification* freely performed, so as to disengage the tumefied surface of the glands. If this should fail to check the inflammatory action, leeches must be applied to the tonsils themselves, or throat externally, or both; and, if suppuration cannot be prevented, it should at all events be kept within as small a limit as possible. When matter has formed,

TONSILLAR.

Scarification of Enlarged Tonsils in a state of active inflammation. Continued.)

which is indicated with tolerable correctness by fits of shivering, it should be evacuated as soon as possible. The touch will guide the surgeon as to the spot which must be entered by the lancet. This will sometimes be through the anterior arch of the palate, which becomes thin from being stretched out upon the enlarged tonsil, and at others the surface of the tonsils themselves. When the inflammation is extensive, the cellular tissue around becomes implicated and the tonsil itself is lost in the surrounding tumefaction. In these cases, which are supposed to render puncture dangerous, as some parts more immediately in contact with the internal carotid than the tonsil may be wounded, and possibly this vessel itself. To obviate this risk, the rule should be in all cases to make the puncture as nearly as possible in the situation of the tonsil, which is free from danger. If practicable, the tonsil to be operated on should be seized by forceps, and drawn out towards the median line of the throat. After judicious puncture all the alarming symptoms usually subside.—“Yearsley on the Throat.”

FIG. 2391.—Buck's Throat Lancet.



See TOROLD'S
CONCEALED TONSIL LANCET,
MACKENZIE'S
LARYNGEAL KNIVES,
&c., &c.

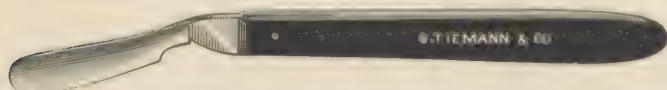
TONSILOTOMY.

Notwithstanding all that has been written, a difference of opinion still exists as to the propriety of excision of enlarged tonsils, merely from misapprehension of what the operation really consists. The phraseology which is adopted in speaking of it, such as “*excision of the tonsils*,” “*tonsil cutting*,” “*cutting away the tonsils*,” is calculated to mislead, and it is asked, with some show of reason, how an operation can be justified which removes an important part of the animal economy? Now, in point of fact, nothing of the kind is done; it cannot be too often repeated, that the tonsils in a healthy state are never interfered with, but only when enlarged, that is to say, *diseased*, and then only to the extent of the enlargement, sufficient of the gland being always left to perform its function—the secretion of mucus.

The operation can be performed without the slightest risk, and, incredible as it may appear, frequently without the slightest pain. My own experience now extends to more than three thousand cases, each unattended by accident or subsequent inconvenience, whilst the great majority had been followed by relief of the particular malady, whether defect of speech, deafness, obstruction to respiration or swallowing, cough, or impaired health, which singly or conjointly, may have necessitated the operation.—“Yearsley on the Throat,” p. 57.

Operation.—I place my patient opposite a good light, and having requested that the mouth be opened to the greatest possible extent, I introduce the tenaculum (held in the right hand, if about to excise the left tonsil; in the left, if the right) over the tongue, and include within its grasp as much of the morbid growth as possible. I then draw out the diseased tonsil from between the pillars of the fauces diagonally across the throat, and over the bridge thus formed I introduce the knife, held like a pen. As I cut forward towards myself, I keep slightly dragging at the tenaculum, so that when the excisor is completed, the portion of the enlarged gland grasped by the tenaculum and the knife are withdrawn at the same moment.—Yearsley, page 62.

FIG. 2392.—Yearsley's Tonsil Knife.



When hypertrophy is accompanied by induration, whether this condition co-exists with follicular disease or is the effect of chronic tonsillitis, excision of the enlarged gland is almost the only method of treat-

ment by which permanent and effectual relief can be obtained.—“On Diseases of the Air Passages.” Dr. Horace Green, New York.

“* * * The President asked the indulgence of the Academy, while he referred to certain points in connection with chronic hypertrophy of the tonsils and its treatment. Inasmuch as no allusion had been made to one whose experience and extraordinary dexterity in manipulation had, perhaps, never been equalled, whatever may have been thought of his pathological views or practice, he would refer to the method of operating adopted by Dr. Horace Green, because he thought that all that could be should be known relative to the operation for removal of the tonsils.”—Proceedings of the New York Academy of Medicine. April 1, 1880.

“The best and most satisfactory method of treating hypertrophied tonsils is to cut them off as close to the pillars of the fauces as possible. This may be done in adults by means of a pair of forceps and a bistoury—the operation being, however, rather tedious and bloody, but, strange to say, not at all painful. A better, quicker and more safe mode of operating is by means of an instrument called the ‘tonsilotome.’”—“Diseases of the Throat.” Seiler. 1883.

TONSILOTOMY.

For Removing Portions of the Enlarged Tonsils.

Dr. Green, after trying various methods, finally settled upon the following, alluded to by Dr. Hamilton. His method was to seize the tonsil with a single hook, bring it forward, and then, with a bistoury, cut away the exact amount he wished to remove. He always operated upon the left tonsil first, standing in front of the patient, and cut from above downward. When the right tonsil was removed, he stood behind the patient, seized the gland, and cut from below upward. Scarcely ten seconds were required to perform the operation.—*N. Y. Med. Record*, May 1, 1880.

FIG. 2395.—Green's Double Hook.



FIG. 2396.—Tenaculum Forceps, for Seizing (Vulsellum).



FIG. 2393.—Tonsil Scissors, Curved on the Flat.



FIG. 2397.—Green's Tonsil Bistoury.

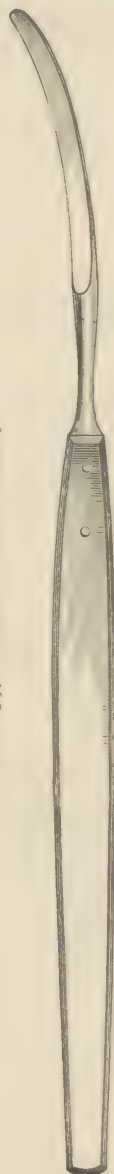


FIG. 2398.—Durham's Seizing Forceps.



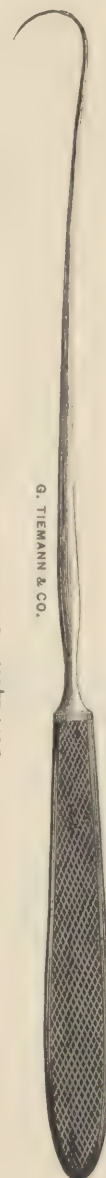
FIG. 2394.—Musseux's Forceps, for Seizing (Vulsellum).



FIG. 2399.—Langenbeck's Seizing Forceps.



FIG. 2400.—Green's Tonsil Hook.



TONSILOTOMY.

For Removing Portions of the Enlarged Tonsil.

FIG. 2401.—Fahnestock's Tonsilotome.



Fahnestock's tonsilotome is an annular knife, moving in a split ring. The tonsil is encircled by this ring, and a stout needle on the exterior of the instrument is pushed through the gland for transfixing it. When thus secured, the parts that protrude are cut by pulling on the handle of the blade. To use this instrument both hands are needed.

FIG. 2402.—Mathieu's Tonsilotome.



The use of Mathieu's tonsilotome requires but one hand and one motion. The middle and index fingers are passed into the double rings, the thumb into the other. After the fork has been pushed through the tonsil, it rises and draws the gland through the ring, then a catch is lifted and the knife is drawn down, cutting the protruding mass with the same motion of the hand that drove the fork forward.

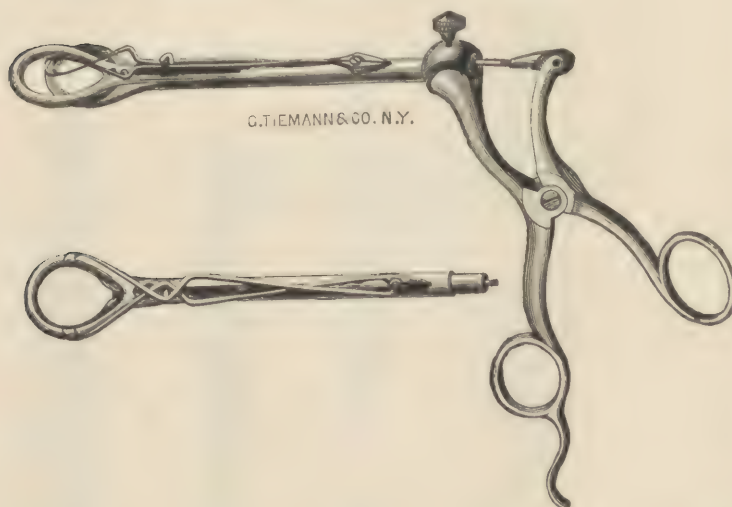
FIG. 2403.—Billing's (U. S. A.) Tonsilotome.



The use of Billing's tonsilotome requires but one hand. The middle and index fingers are placed into the double rings of the lower shank, the thumb into the ring of the blade. The blade moves and is guided in grooves. It cuts like a chisel.

Modus Operandi.—The blade is drawn back, to open the aperture for the reception of the tonsil and the seizing forceps. After taking hold of the instrument as stated above and applying the ring over the tonsil, the blade is pushed home by the thumb, this cuts the tonsil whilst the forceps hold the excised part. The closing movement of the forceps is automatic.

FIG. 2404.—Tiemann & Co.'s Tonsilotome.



The instrument may be fixed in position by the thumb-screw to suit the right or left tonsil. Its use requires but one hand and one motion, leaving the other hand free. It is *not automatic*—every part of the operation is done and watched by the intelligence of the operator. When once applied to the tonsil, only the closure of the scissor-handles is required; this will first seize and then cut the gland. The opening of the handles releases the grasp on the excised portion of the tonsil, when the instrument is withdrawn after use. It may be taken apart and cleaned without the aid of a screw-driver. Different size blades can be fitted into the same handles.

Dr. Post had been in the habit of using a guillotine made by Tiemann, and it seemed to him to be as perfect as could be.—*Medical Gazette*, May 1, 1880.

TONSILOTOMY.

For Removing Portions of the Enlarged Tonsils.

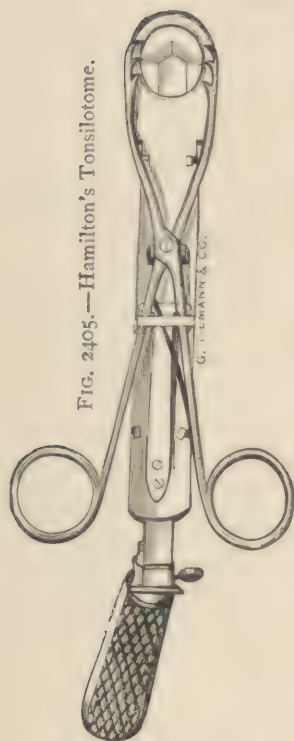


FIG. 2405.—Hamilton's Tonsilotome.

Owen's original instrument I have considerably modified, and it is this modified instrument which I now present to you, and nearly in the form I have used it hundreds of times. The handle is sufficiently large to be felt in the grasp, and it is not smooth and slippery. It is placed at an angle, so as to remove the hand from the front of the mouth. The shaft is composed of two firm plates, which, including the ring or fenestra, are about $6\frac{1}{2}$ inches long and $\frac{3}{4}$ of an inch wide, except the ring, which, in its outer circumference, is $1\frac{1}{4}$ inch wide, and in its inner circumference $\frac{3}{4}$ of an inch wide by $1\frac{1}{8}$ inch in length. The plates are jointed together by movable hooks instead of screws, as was the case in Owens' original instrument. The forceps in the original instrument had simply straight bone for handles. I have curved them, as you see, and added rings as in scissors, into which the thumb and forefinger may be inserted for the purpose of giving a secure hold.

These forceps can be moved laterally as well as upwards, and thus by oscillation draw the larger tonsils through; and I have provided braces for them to limit the extent of their motion. The cutting portion of the instrument is cambered, or lance-shaped, and cuts by entering its point first and then penetrating the gland, moving from before back.

Mode of Using the Instrument.—The tonsils having been previously thoroughly examined (I do not find it necessary to look into the mouth while operating, although it is always easy to do so, when the instrument is in place). The patient being seated, with the head thrown back, the instrument being held in the right hand in the case of the left tonsil—is carried in flat-wise, with its dorsal surface, or the surface supporting the forceps, below; it is then turned upon its axis about one-quarter, and carried to the tonsil, and it is pressed against the tonsil from below up and out, as the tonsil generally or often hangs down a little and is more easily looped from below. Now the forefinger of the left hand is carried along the dorsal surface of the instrument, under the protection of the broad plates of the shaft, until the tonsil is felt, and its presence in the ring is assured. The forefinger is then with-

drawn and the same finger, with the corresponding thumb placed in the rings of the forceps, the tonsil is seized and drawn through; and now the thumb of the right hand, which holds the handle of the instrument, is placed upon the projecting end of the cutting shaft and the knife is projected firmly through the gland. The tonsil is held by the forceps and safely removed with the instrument. In removing the right tonsil, the employment of the hands is reversed.—Dr. F. H. Hamilton, *Medical Gazette*, May 1, 1880.

FIG. 2406.—Mackenzie's Tonsilotome.

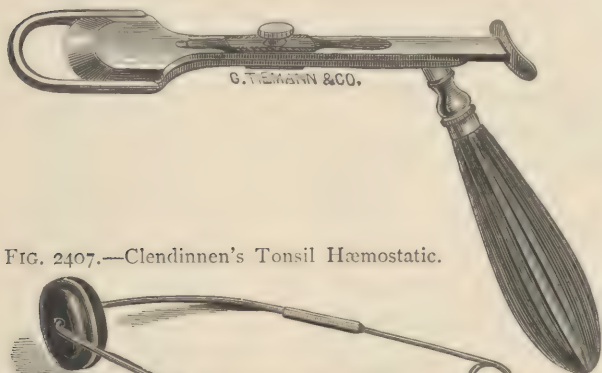
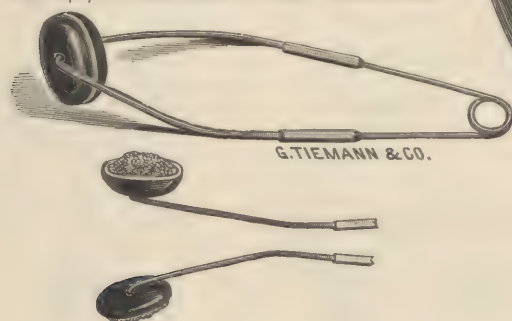


FIG. 2407.—Clendinnen's Tonsil Hæmostatic.



The guillotine which I employ is the same as that of Physick, slightly modified, so that the handle can be applied to either side of the shank. This arrangement enables the operator to use one instrument with his right hand for amputating either tonsil, the free surface of the blade in each case being directed towards the centre of the mouth. The instrument being ready for use, the hilt is grasped in the right hand, and the aperture in the shank is placed over the tonsil. The surgeon, with the thumb or index finger of the left hand placed under the angle of the patient's jaw, then presses the tonsil inward, whilst at the same moment, with the thumb of the right hand, he drives home the blade of the tonsilotome.—“Diseases of the Pharynx, Larynx and Trachea.” Mackenzie.

Take sponges fitting the bowls, wet to softness; then squeeze out dry and replace in the bowls; pour on their centres a little melted caustic potash. It hardens immediately and is ready for application. It takes hold of the sponge fibre, but leaves room for the passage on its sides of tonsil discharge, which the sponge absorbs—thus preventing any outflow of caustic on contiguous parts whilst applied or on removal of the instrument.

UVULAR.

EXCISION OF THE UVULA.

In regard to the uvula, also, nothing could justify the removal of that appendage to the palate in the healthy state, however unimportant a part it may play in the functions of the throat; but when in an elongated condition, giving rise to most distressing symptoms, and even threatening suffocation, the propriety of reducing it to at least its natural dimensions cannot be questioned.—“Yearsley on the Throat.”

In numerous cases in which I have resorted to excision of the uvula, I have never seen any ill consequences, but, on the contrary, the most striking relief from the removal. I have often known the injury to the voice and the respiration, the harassing cough of years, removed in a moment by the loss of the uvula. The operation, moreover, renders the voice clearer than before, and increases its compass. In some professional singers I have proved that the excision of the uvula has gained for the patient one, two, or even three notes in the voice, and this not in the falsetto, but in the natural register.

In treating of elongation of the uvula, Dr. Horace Green says: “In simple elongation of the uvula, dependent upon relaxation of the parts, the use of stimulant or astringent gargles may, in some slight and recent cases, be sufficient to overcome the difficulty. But where hypertrophy actually exists, and the uvula itself is both thickened and elongated, excision will prove the only effectual remedy. So simple is this operation, and so entirely unattended with subsequent danger or inconvenience, that the removal of the uvula should not be omitted or delayed in cases of follicular disease, where its elongation serves to increase and prolong the irritation.”—“Yearsley on the Throat,” p. 61.

The uvula is occasionally productive of disagreeable effects from mere relaxation of the soft palate, independently of any particular disease of its own substance. The palate, thus affected, hangs down into the fauces, and thereby permits the organ to encroach upon the larynx and root of the tongue in the same manner as in actual elongation. Such a condition is very common in dyspeptic and consumptive subjects, in whom it often constitutes a source of great annoyance. The only reliable remedy for this affection is excision of the uvula. The patient being seated upon a chair opposite a good light, the surgeon depresses the tongue, and, with a polypus forceps, seizes the apex of the uvula, which is then cut off with a pair of probe-pointed scissors, slightly curved on the flat. An instrument which combines both forceps and scissors (Fig. 2409) will be found convenient for this little operation. * * * If I were obliged to operate upon a professional singer, I should limit myself to the removal of a comparatively small portion of the elongated organ.—“System of Surgery.” Gross. Vol. II., p. 483. Sixth edition. 1884.

FIG. 2412.—Tiemann & Co.'s Universal Forceps.



FIG. 2408.—Uvula Scissors.



FIG. 2409.—Uvula Scissors with Claws, for Seizing and Excision.

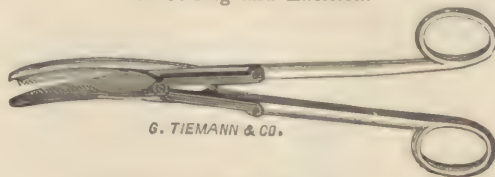


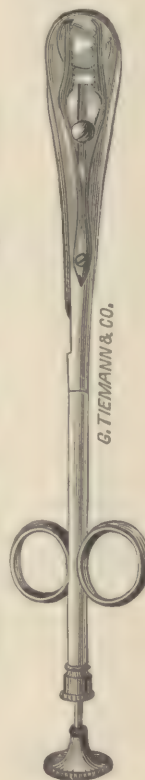
FIG. 2410.—Vulsellum Forceps.



FIG. 2411.—Knox's Uvulatomer, for Seizing and Excision.



FIG. 2413.—Mackenzie's Uvulatomer, for Seizing and Excision.



PHARYNGEAL.

PHARYNX.

Pharynx.—That part of the alimentary canal situated behind and below the mouth and above the œsophagus, with which it is continuous. It is a muscular membranous sac, conical or pyriform, with its base upward, and extends from the base of the skull to the cricoid cartilage in front and the fifth cervical vertebra behind, being about four and one-half inches long in the adult human subject. Its transverse is greater than its antero-posterior diameter. It is connected behind by loose areolar tissues with the cervical portion of the vertebral column, and some of the muscles of the neck situated there. Seven openings communicate with it; the two posterior nares, the two eustachian tubes, the mouth, the larynx, and the œsophagus. The pharynx is placed behind the larynx, as the œsophagus is placed behind the trachea or windpipe; and the glottis, or opening into the larynx, which in swallowing is closed by the vascular epiglottis, is in the front side of the pharynx, and looks backward into its cavity. It is divided from the cavity of the mouth by the velum palati, or soft palate. The pharynx has three coats: a mucous or lining coat, next to it a middle or fibrous coat, and beneath this the muscular coat. The mucous coat is continuous with that of the mouth and adjacent passages. The fibrous coat, called the pharyngeal aponeurosis, is thick above, where the muscular fibres are wanting, and is firmly connected with the occipital and temporal bones of the skull. As it descends it gradually diminishes in thickness until it disappears. The muscular coat is composed of five pairs of muscles, viz.: three constrictors and two elevators. The constrictors, called superior, middle, and inferior, have their fibres directed transversely downward around the pharynx, being mostly united in a continuous *raphe* or suture behind, but attached to different and separated points in front, most of the fibres of the superior constrictor being inserted into the palate and sphenoid bones, the lower jaw bone, the root of the tongue, and some other muscles and ligaments. The middle constrictor is principally inserted into the hyoid bone, at the root of the tongue. The fibres of the inferior constrictor are mostly united in front to the thyroid and cricoid cartilages. The elevator muscles rise from points at the base of the skull, and passing nearly vertically downward, have most of their fibres inserted into the posterior border of the thyroid cartilage. From this description the action of the muscles, as far as the pharynx is connected with the function of deglutition or swallowing, will be apparent. When a portion of food is about to be swallowed, the pharynx is drawn upward and dilated to receive it, the elevator muscles drawing the sides outward as well as upward. As soon as the food is thrown into the cavity by the action of the tongue, the elevators relax, and the constrictors, beginning above, contract successively and propel the food downward into the œsophagus, which transmits it to the stomach. Besides its action in deglutition, the pharynx exerts an important influence in modulating the voice by the different dimensions it is capable of assuming. It is well supplied with mucous glands. Follicular glands are spread over its whole extent beneath the mucous membrane, and across the upper part is a thick layer of rasemose glands, all of which, especially during mastication and deglutition, pour out an abundant secretion of lubricating mucus. The pharynx is liable to be attacked by inflammation (pharyngitis), and is one of the common seats of exudation in diphtheria. Its mucous membrane is often the seat of common catarrh, like that which lines the respiratory passages. In scarlet fever, measles, and other exanthematous diseases, it has a specific inflammation.—“American Cyclopædia.”

The *pharyngo-nasal space* is continuous anteriorly with the nasal cavities, and laterally communicates, by means of the eustachian tube, with the middle ear. The upper wall of the roof is rich in gland tissue, and shows numerous depressions and crypts. In some subjects there is a cavity of considerable depth situated posteriorly and in the centre of the roof, in which are found openings of numerous follicles. This collection of follicles has been described by Luschka (“*Der Schlundkopf des Menschen*.” Tübingen, 1868, p. 110) as an acinous gland, named the “pharyngeal tonsil” (called also “Luschka’s tonsil,” see page 220), in contradistinction to the analogous glands in the fauces. This tonsil is about a centimetre in thickness, and is situated near the vault of the pharynx, between the orifices of the two eustachian tubes.—“Pharynx, Larynx and Trachea.” Mackenzie. 1880.

The *pharyngo-oral cavity* may be said to be limited superiorly by the level of the base of the uvula, and below by a plane passing through the posterior extremities of the greater curve of the hyoid bone. The posterior surface of the uvula must be regarded as its incomplete anterior wall, the pillars of the fauces its lateral walls, and the base of the tongue, together with the folds of mucous membrane enclosing some muscular tissue and known as the pharyngo-epiglottic folds, its lower margin.—“Pharynx, Larynx and Trachea.” Mackenzie. 1880.

PHARYNGOSCOPY.

Pharyngoscopy (see page 207), or posterior rhinoscopy, is accomplished by means of the same appliances as used in laryngoscopy, *i. e.*, a small plane mirror for introduction and one of the various instruments for illuminating. (See “On the Use of the Laryngoscope.”) Special rhinoscopes are invented by Duplay, Simrock, Fränkel, Jarvis, and others. (See page 208.)

PHARYNGOTOMY.

Pharyngotomy.—“Some authors have used this word synonymously with œsophagotomy. It means, also, scarification of the tonsils (page 242), or an incision made for opening abscesses there, &c.”—DUNGLISON.

PHARYNGEAL.

VAULT OF THE PHARYNX.

The post-nasal forceps here shown are of the pattern recommended by Prof. Lefferts, in his "Pharmacopœia for the Treatment of Diseases of the Larynx, Pharynx and Nasal Passages." Putnam. New York: 1884.

They were devised by Löwenberg of Paris. Their peculiar shape renders them easy of introduction into the vault of the pharynx even in children, and as a practical and efficient instrument for the safe removal of adenoid vegetations from the pharyngeal vault they may be confidently advised.

FIG. 2414.—Post-Nasal Forceps.

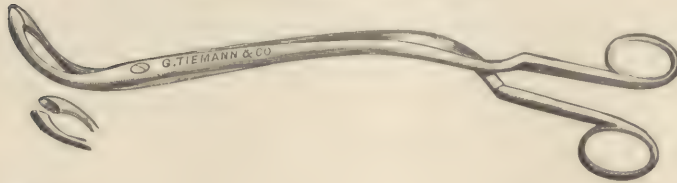
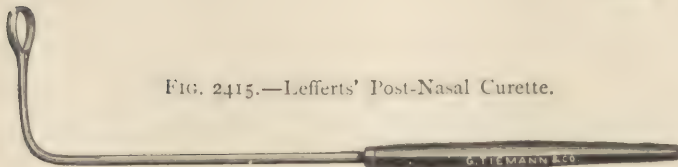
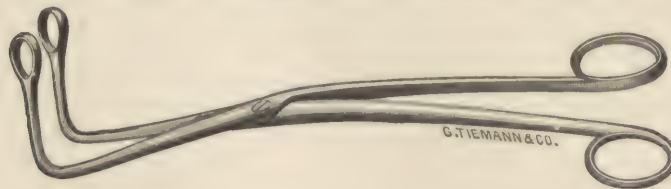


FIG. 2415.—Lefferts' Post-Nasal Curette.



When the hypertrophy of the tissues extends broadly, in the shape of small, slightly elevated, nodular masses, over the entire pharyngeal vault, a sharp curette, such as is used in uterine operations, with copper shank that can be suitably curved to pass behind the velum into the upper pharynx, will answer a better purpose in scraping away the vegetations than the forceps, which would here be difficult of exact application.—Lefferts.

FIG. 2416.—Holbrook Curtis' Post-Nasal Forceps.



The forceps are made on the principle of Thomas' double uterine curette, the sharp edges continuing all around the opening, the blades approximating as the instrument is closed. The forceps are introduced by aid of the rhinoscopic mirror, and the growth, or a portion of it, seized. As the blades are brought together, the cut material passes through the fenestrated openings, which enables the operator to incorporate a much greater portion of the growth at one cutting than when the ordinary cup forceps are applied.—"Medical Record," October 7, 1885.

FOR CLEANSING THE NASAL PASSAGES.

The nasal spray apparatus (see Fig. 2417) was devised some years since by Dr. George M. Lefferts, Professor of Laryngoscopy and Diseases of the Throat in the College of Physicians and Surgeons, New York, to supersede the use of the nasal douche as a means of effectively and harmlessly cleansing the nasal passages. It is an apparatus arranged to throw a *very coarse spray*, with some force and in the proper direction, into the anterior nares. The conical tip of the instrument closes the nostril completely, the medicated fluid spray then enters one nasal passage and passes out by the other. Power is obtained by means of a double hand-ball tube.

With this apparatus and a suitable medicated fluid, the nasal passages and upper pharynx may, except in rare instances, be thoroughly cleansed of secretions and crusts by the use of less than one ounce of the medicated fluid contained in its bottle or reservoir. Here at once is an immense advantage gained over the pint or even quart of fluid commonly used in the nasal douche. Being a *coarse spray* it washes up, loosens and dislodges the secretions—unless, as in rare instances, they are impacted firmly—in which case the anterior or posterior nasal syringe must be employed (see Fig. 2418), by the constant commotion of the fluid in the nasal passages, and this very readily and quickly.

Explicit directions should be given to the patient in every case, as to the proper use of the apparatus. They should accompany every box in which that instrument is sold.

The medicated fluid used in the apparatus is always a warm alkaline one (borate of soda, bicarbonate of soda, or "Listerine"); a saline solution (chloride of sodium) is never used.—"The Diagnosis and Treatment of Chronic Nasal Catarrh." Lefferts. St. Louis: Lambert and Co., 1884.

PHARYNGEAL.

CLEANSING THE NASAL PASSAGES.

FIG. 2417.—Lefferts' Nasal Spray Apparatus.



Directions for Use.

"1. Warm the medicated fluid in the bottle before using by holding the filled bottle for a few moments in hot water.

"2. Hold the body erect and incline the head very slightly forward over the toilet basin.

"3. Introduce the conical nozzle of the apparatus into the nostril (first on the side most occluded), far enough to close it perfectly, holding at the same time the horizontal tube of the apparatus directly outwards from the face; do not turn it from side to side or downwards, and make a trial of the spray by compressing the hand-ball once, to prove that the opening in the nozzle is not occluded in the nostril; then,

"4. Open the mouth widely and breathe gently but quickly through it in a snoring manner; avoid carefully all attempts at speaking, swallowing, or coughing. At the moment that the fluid passes in the upper part of the throat from the nostril being operated on, a desire to swallow will be experienced—resist it, and the next second the fluid passes forward through the opposite nostril.

"5. Hold the end-ball of the apparatus firmly in the right hand (the left holds the bottle), and *operate it briskly*, until the spray of the medicated fluid, which should be felt at once to enter the nasal passage, has passed around it and appears at the opposite nostril—at this moment, stop.

"6. Remove the nozzle from the nostril, allow the surplus fluid to run out of the latter; then blow the nose gently, *never vigorously*.

"7. Repeat the operation upon the opposite nostril."

Arrangement and Care of the Apparatus.*

"After filling the bottle two-thirds full with the medicated solution, place the thinnest end of the hard rubber tube into the bottle, securing the entire tube into the neck of the same by a turn. Attach the double bulbs by slipping the rubber hose over the tube (see cut); operate the end ball briskly, when a continuous spray will be produced, issuing from the nozzle.

"Should the fine opening in the nozzle or inner capillary tube become obstructed, clear it with a fine wire that accompanies this instrument. *Never use a pin, needle or hard wire for this purpose.* To facilitate the cleaning of the inner capillary tube, remove the oval nozzle by carefully and slightly rotating the same to and fro, making traction at the same time. Should the apparatus still not work satisfactorily—especially after it has been used some time—the instrument maker will repair the valves in the rubber hose. Every few days, when the instrument is in use, fill the bottle with warm water and force it through the tubes, to cleanse them."—"Pharmacopœia for Diseases of the Throat and Nose." Lefferts. New York and London: Putnam. 1884.

FIG. 2418.—Lefferts' Anterior and Posterior Nasal Syringe.



anterior and posterior nasal syringe, with a warm alkaline solution ('Listerine').

"The instrument here shown (Fig. 2418), and which has been devised by Professor Lefferts for the purpose, presents certain advantages over the many other forms of apparatus that are used to attain the same end. They may thus be briefly stated: 1. The instrument is of hard rubber; 2. It is of a sufficient size to contain a quantity of the cleansing fluid; 3. It is a syringe of some power; 4. The two attachments that are furnished with the one instrument convert it, in a moment, into either an *anterior* or *posterior* nasal syringe; 5. The form of these nozzles or attachments is new and novel, and is specially adapted to fulfill their purpose; 6. The syringe is well and carefully made, therefore durable."

"In certain cases, *i. e.*: atrophic nasal catarrh and syphilitic or strumous ozæna, the ordinary means for cleansing the nasal passages of hard crusts and impacted secretions will fail, and some more powerful method, short of direct instrumental interference, must be employed; this is preferably the use of the

* These directions are applicable to keeping in working order all similar apparatus.—G. T. & Co.

PHARYNGEAL-LARYNGEAL.

FOR DIRECT MEDICATION.

In the work already alluded to Prof. Lefferts' says :

"Having shown you how the parts may be cleansed, if this may be necessary, I turn to the question of direct medication of the disease which affects them.

"The treatment of catarrhal conditions of the nares is based practically either upon the employment of various *medicated fluids*, used in spray by means of some form of atomizer, or upon the use of *medicated powders*, applied with the anterior or posterior nasal powder insufflator, in one of its various forms. Both methods have their warm advocates."

Medicated Sprays.

"My own experience prejudices me strongly in favor of the *medicated spray* as a means of making a thorough and efficient application to a diseased laryngeal mucous membrane. There is, I think, no question as to its superiority over other methods, in applications to the upper pharyngeal space and posterior nares, as well as anteriorly, through the nasal passages. I believe, that with a proper spray tube and a pressure of compressed air of about forty pounds to the square inch—which is obtainable by means of the "COMPRESSED AIR SPRAY APPARATUS" (Fig. 2420)—no more perfect application can be made to the parts."

"I prefer this high pressure of compressed air to the lower pressure so often recommended. I have never done harm to the mucous membrane with it, and the increased power of propulsion in the cloud of spray renders it possible to reach instantly, before any spasmodic action of the larynx takes place, its entire mucous surface. In the nasal passages the same pressure causes the spray to enter and thoroughly bathe all the many irregularities and recesses that here abound."

Spraying the Nasal Passages.

"The patient depressing his tongue by means of a spatula, the velum palati must be drawn forward—that is, away from the posterior pharyngeal wall—by means of a suitable palate hook made of strong metal wire, of the proper form and size and covered with bougie material; the contact of the latter with the throat being much better borne than that of metal. This procedure can be readily accomplished in *all* cases after a little practice, and is one that I regard as *absolutely essential* to the thorough success of the spray application, as it is the only way in which a practicable degree of space can be gained through which to throw a spray upwards and forwards through the nasal passages. To attempt an application with the velum drawn upwards and backwards—closely approximated to the pharyngeal wall—is useless; in this position it will be found the moment the operator introduces the spray tube into the patient's mouth, in nine cases out of ten.

"The palate hook will overcome this difficulty. It is held in the operator's left hand and is quickly introduced into the mouth and turned so as to pass under the edge of the velum; then drawn forwards, carrying the velum with it, and thus opening up a space between the posterior pharyngeal wall and velum, into which the end of the spray tube (the latter held and controlled by the operator's right hand) is passed, and the spray thrown upwards into the vault of the pharynx and forwards through the nasal passages, so that it appears, at both nostrils, in a fine cloud.

"Such applications as are here described are thorough and complete, not painful, nor even very disagreeable to the patient, and that the results, obtained by a series of such, far exceed those obtained by any other method of local application, ample experience has shown."

Spraying the Pharynx.

"A spray application to the middle pharynx is made at the moment that the operator, with his left hand holding the spatula, depresses the patient's tongue well down into the floor of the mouth, and while the latter is breathing quietly, in order that the parts, viz.: the faucial pillars, soft palate, and constrictor muscles of the pharynx, may be relaxed, not contracted."

Spraying the Larynx.

"A spray application to the larynx should always be made, as is that with the laryngeal brush, under the guidance afforded by the laryngeal mirror. The concave forehead mirror and artificial illumination being used, the patient holding his own tongue and phonating the vowel sound 'e,' in order to elevate the epiglottis and bring the vocal cords together at the instant before the volume of spray is discharged into the larynx; the operator holds the spray tube in his right hand and the laryngoscopic mirror in his left."

FIG. 2419.—Lefferts' Palate Hook.



PHARYNGEAL-LARYNGEAL.

FOR DIRECT MEDICATION.

For the Production and Application of Medicated Spray.

FIG. 2420.—Lefferts' Compressed Air Spray Apparatus, Complete.

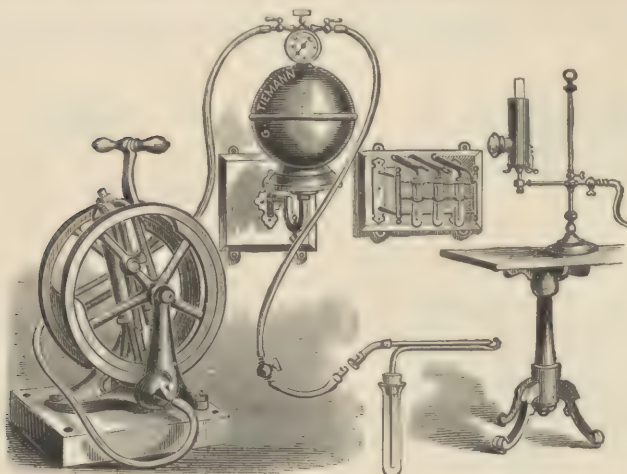


FIG. 2421.—Air Receiver.



FIG. 2422.—Air Receiver.



Component Parts of the Compressed Air Spray Apparatus.

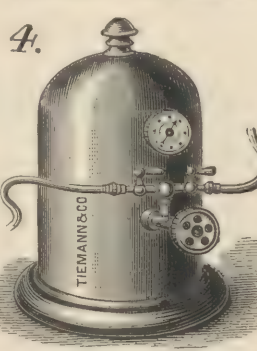
The cylinder or condensed air receiver, of which four (1, 2, 3, 4) different patterns are shown, is a necessary part of the compressed air spray apparatus. They are made of heavy copper, with strong hard-soldered joints, and burnished to a high degree of finish, and nickel-plated. A steam guage, to indicate the amount of air pressure, is a convenient adjunct to it, but not an absolute necessity. The stop-cocks, to control the entrance and exit of air, are made of brass, and especially ground true and air tight. In the complete apparatus shown, Fig. 2420, the cylinder or receiver is connected with the air-pump by means of *hydraulic rubber tubing*, and in turn with the glass, rubber or metal spray tube, Figs. 2426, 2427, 2428, by rubber tubing of small calibre—which should be overspun with silk or mohair, in order that it may possess strength combined with flexibility. These tubes are firmly secured to the connecting fittings (*i. e.* air receiver, &c.) by means of close air-tight, metal collars.

"There are various patterns of pumps for the purpose of obtaining a given degree of air pressure in the cylinder or air receiver. They differ in size, mechanism, and degree of power. Figs. 2420-29 represent those employed by Prof. Lefferts.

FIG. 2423.—Air Receiver.



FIG. 2424.—Air Receiver.



PHARYNGEAL-LARYNGEAL.

FOR DIRECT MEDICATION.

For the Production and Application of Medicated Spray.

FIG. 2425.—Attachments for the End of Spray Tubes.

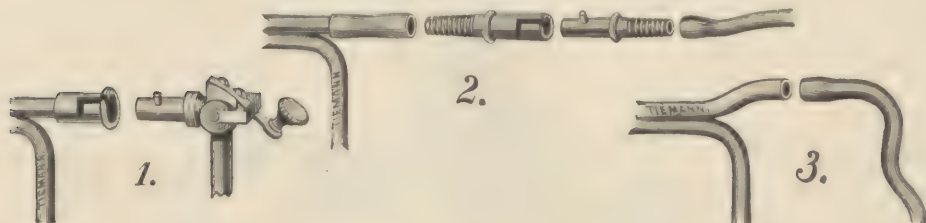
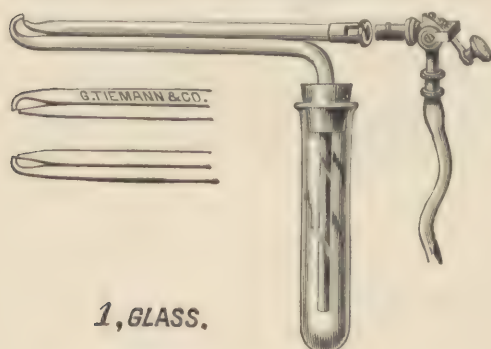


FIG. 2426.—Spray Tube, with Bayonet and Cut Off.



The "automatic cut off" (1) is attached to the end of the spray tube for the purpose of controlling the air current. Another method is to attach the spray tube by means of a *metal bayonet joint* (2), or the connecting tube from the air receiver may be simply slipped on (3) and the current controlled by pressure with the thumb against the end of the spray tube.

FIG. 2429.—Double Acting Air Compressor.

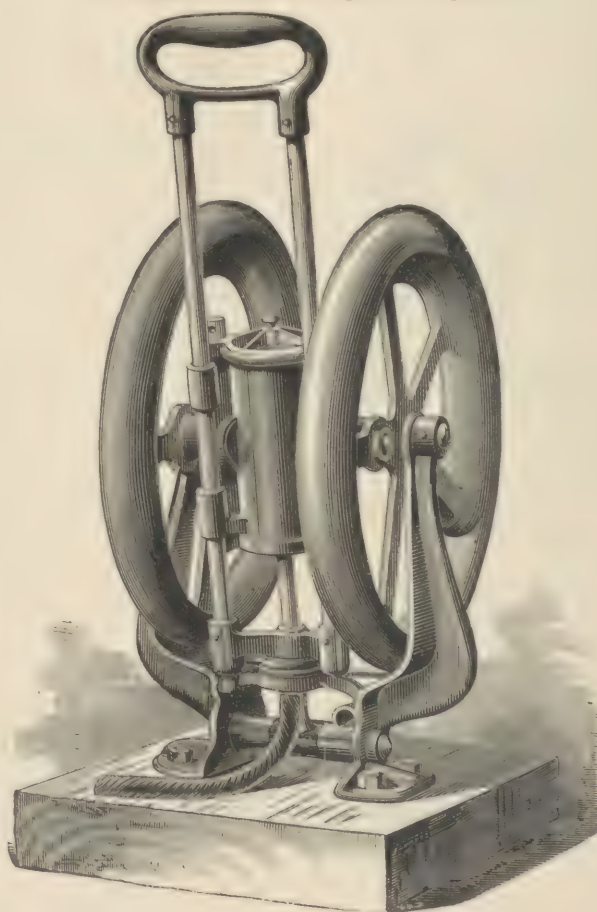
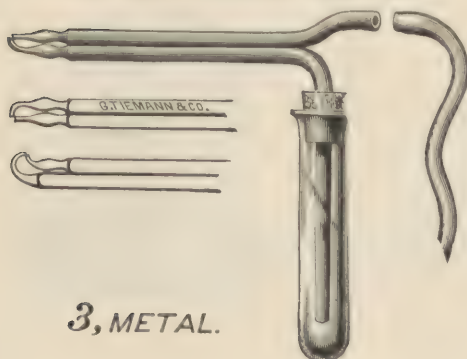


FIG. 2427.—Spray Tube, with Bayonet End.



FIG. 2428.—Plain End Spray Tube.



PHARYNGEAL-LARYNGEAL.

FOR DIRECT MEDICATION.

For the Production and Application of Medicated Spray.

Prof. Lefferts says: "If the general practitioner has not, or can not obtain the above instruments—viz.: the compressed air spray apparatus with air pump and spray tubes—he is necessarily obliged to depend upon some form of *hand atomizer* constructed upon either the principle of Richardson or Bergson, in which the propelling power is developed by the use of the hand ball bulbs and tubes."

Hand Ball Atomizers.

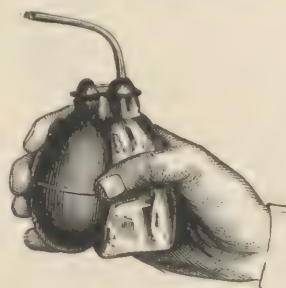
FIG. 2430.
Hard Rubber Hand Atomizer,
Continuous Spray.



"In any of these forms of atomizers the hand balls should be double, in order that a continuous spray may be produced; and each instrument must be provided with three separate tips (occasionally only two are furnished, one of which is reversible), which screw or fasten on the horizontal hard rubber bar of the spray tube: one throws the spray downward to the larynx, one upwards into the naso-pharynx and the third directly backward into the pharynx.

"Such an apparatus is shown in Fig. 2430. Finally the cheapest and simplest form of atomizer is found in Fig. 2431. In default of all other spray apparatus it not unfrequently answers a good remedial purpose. Its use with proper medicated solution is certainly more effective in both pharyngeal and laryngeal affections than the old time-honored prescription of a gargle.

FIG. 2431.—Atomizer,
Throwing a Coarse Spray.



For the use of hand ball atomizers the following directions are given by Prof. Lefferts:

To make an Application to the Larynx with the Hand Atomizer.

"The patient must stand or sit facing the operator, so that a good light is thrown into the widely opened mouth; or, still better, the operator should use the concave forehead reflector, with artificial light. The patient draws his tongue well out of the mouth, and holds it between two fingers of the right hand, the tongue having first been covered by a small clean napkin. The operator now carefully passes the horizontal bar of the atomizer, on which is placed the tips which throw the spray, *downward*, well back into the pharynx, without, however, touching the posterior pharyngeal wall, and holds it steadily with the left hand in a position which his anatomical knowledge tells him is such that the point of the instrument is directly above the mouth of the larynx (the laryngoscope cannot, of course, be used during this procedure, as both of the operator's hands are occupied). The patient now takes a deep, full and *quick* inspiration, at the same moment that the operator begins to compress the air bulbs of the apparatus *vigorously*. A short, sharp, laryngeal cough will be the evidence that the spray has entered the larynx."

To make an Application to the Pharynx.

"The application to the posterior pharyngeal wall is an easy matter, for the parts are directly before the operator and under his vision. The patient depresses his tongue by means of a spatula, and breathes quietly. The proper tip is, of course, to be placed on the spray tube."

To make an Application to the Nasal Passages.

"A proper application with the "hand ball spray" to the posterior nasal passages and upper pharynx is the most difficult. A patient is rarely found with a throat tolerant enough to allow of the spray being thrown with this instrument up behind the velum into the vault of the pharynx and posterior nares. Both of the operator's hands being again occupied with the atomizer, he cannot use the palate hook to draw the velum forward, and, as a rule, therefore, he had better confine himself to applications made through the anterior nares, and forced well and quickly back through them into the pharynx, if he employs this form of instrument.—"Pharmacopœia for Diseases of the Throat and Nose." Lefferts. Putnam: New York and London, 1884.

For local medication, see also "LARYNGEAL BRUSHES, SPONGE HOLDERS, INSUFFLATORS AND CAUSTIC CARRIERS," page 264.

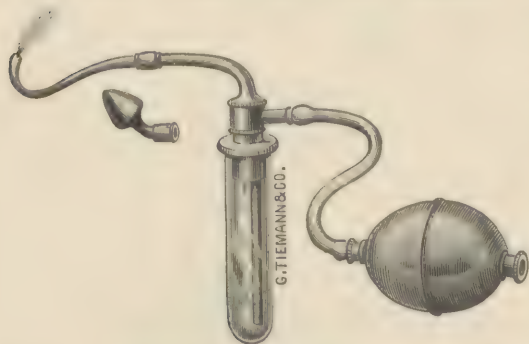
For other forms of "APPARATUS FOR THE ATOMIZATION OR NEBULIZATION OF MEDICATED FLUIDS, FOR INHALATION IN AFFECTIONS OF THE AIR PASSAGES, see page 284.

PHARYNGEAL-LARYNGEAL.

FOR DIRECT MEDICATION.

For the Application of Medicated Powders.

FIG. 2432.—Lefferts' Nasal Powder Insufflator.



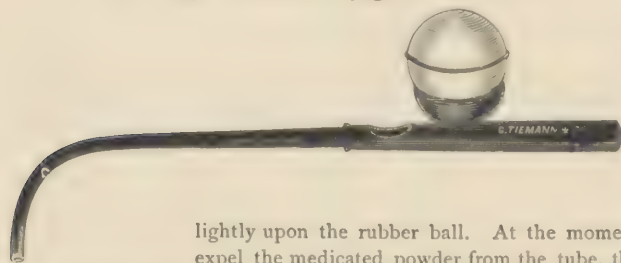
In cases where medicated spray applications are not well borne by the nasal mucous membrane, causing pain and irritation, or perhaps, in any case, in accordance with the special views of the physician, a medicated powder may be substituted. Powders are particularly adapted to the treatment of simple chronic rhinitis, where the secretions are readily removable, and the parts soft and absorptive.

The powder insufflator adapted for the treatment of diseases of the nasal passages is shown in the wood-cut. It is arranged to deliver, by means of the air pressure developed by the hand ball, a charge of powder contained in the bottle into the anterior nares, by means of the short nozzle. The long curved tube, which should be introduced with care behind the velum of the patient, performs the same operation in the posterior nares and the vault of the

pharynx.—“Pharmacopeia for Diseases of the Throat and Nose.” Lefferts. Putnam: New York and London, 1884.

In the *New York Medical Record* of Nov. 17, 1873, Prof. Lefferts describes his modification of the Rauchfuss insufflator, and speaks in addition of its advantages over the ordinary powder insufflator for the larynx, in which the propelling power is the breath of the operator—a detail which may be objected to by a fastidious patient; moreover, those who use it are not free from the danger of receiving into their own mouth a portion of the powder with which the instrument is charged, should the patient suddenly cough while the insufflator is in position in his throat. The foetid breath of a patient with cancer, syphilis or phthisis of the throat may in a like manner reach the mouth of the operator.

FIG. 2433.—Lefferts' Laryngeal Insufflator.



lightly upon the rubber ball. At the moment of compressing this with the finger, in order to expel the medicated powder from the tube, there is no sudden movement, as is the case with the Rauchfuss insufflator, in which an impulse *forwards* is given to the instrument, thus altering the position of its point in the larynx and throwing the powder wide of its mark.

All of these disadvantages are obviated by Prof. Lefferts' modification of the laryngeal insufflator.

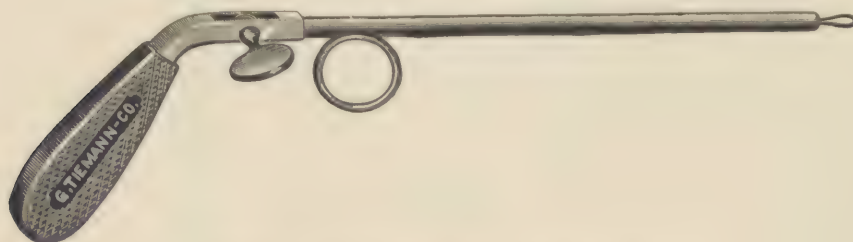
Its advantages over the Rauchfuss instrument are, that its form, size and curve admit of its accurate and skillful introduction into the larynx, and allow of its *remaining steady in the hand* during compression of the ball, thereby insuring an accurate application of the powder.

The tube is held by the right hand in the position of a writing pen, the index finger resting

For “NASAL DOUCHES, SYRINGES, SPRAYS, INSUFFLATORS, BRUSHES AND APPLICATORS,” see pages 209, 210, 211.

See list of “LEFFERTS' EXAMINATION CASE FOR LARYNGOSCOPY AND RHINOSCOPY,” page 256. Illustration of the same (Fig. 2450).

FIG. 2434.—Penn's Catgut Ecraseur, for the Removal of Polypi.



“*Southern Practitioner*, Nashville, October, 1885.”

PHARYNGEAL-LARYNGEAL.

LARYNX, THE ORGAN OF VOICE.

The larynx is the organ of voice, placed at the upper part of the air passages. It is situated between the trachea and base of the tongue, at the upper and fore part of the neck, where it forms a considerable projection in the middle line. On either side of it lie the great vessels of the neck; behind, it forms part of the boundary of the pharynx, and is covered by the mucous membrane lining that cavity.

The larynx is narrow and cylindrical below, but broad above, where it presents the form of a triangular box, flattened behind and at the sides, whilst in front it is bounded by a prominent vertical ridge. It is composed of cartilages, which are connected together by ligaments and moved by numerous muscles; the interior is lined by mucous membrane, and supplied with vessels and nerves, &c.—“Gray’s Anatomy.”

The epiglottis, consisting of a single leaf-shaped cartilage, is attached to the front of the larynx. It is elastic, easily moved, and fits accurately over the entrance to the air passages below it. Its office is to guard these delicate passages and the lungs against the intrusion of food and other foreign articles when the act of swallowing takes place. It also assists in modifying the voice.—“Hutchinson’s Physiology and Hygiene.”

The voice.—The sound produced in the larynx by the vibration of the column of air passing through the rima glottidis. The rima glottidis is the narrow elongated slit or chink situated in the larynx and forming the entrance to the trachea and the lungs. Its boundaries on either side are formed posteriorly by the movable arytenoid cartilages; and in its middle and anterior portions by the so-called “vocal cords”—two nearly parallel bands of elastic tissue, the anterior extremities of which are attached side by side to the inner surface of the thyroid cartilage, their posterior extremities being attached to the points of the arytenoid cartilage. As the anterior extremities of these bands, therefore, are fixed in position, while their posterior portions are capable of being separated from or approximated to each other, according to the movements of the arytenoid cartilages, the rima glottidis may thus change alternately its form and size—being expanded into a comparatively wide triangular opening when the arytenoid cartilages and vocal cords are separated from each other, and reduced to the form of a narrow, almost linear slit, when they are closely approximated. By the varying movements of the arytenoid cartilages, the tension of the vocal cords may at the same time be increased or diminished. It is upon these variations in the width of the rima glottidis, and the position and tension of the vocal cords, that the production and modifications of the voice mainly depends. The first condition of the formation of a vocal sound is the forcible expulsion of air through the larynx. The voice may also be formed imperfectly in inspiration, but only for a short time and with a certain degree of difficulty. The natural time for the continuous production of a vocal sound is during expiration. The chest is first filled with air, and then, by its prolonged and steady expulsion, accompanied by the simultaneous action of the laryngeal muscles and the vocal cords, the vocal sound becomes audible. The second condition is that the vocal cords be approximated to a certain extent and thrown into a state of appropriate tension. Even with a forcible expulsion of air, if the rima glottidis be widely open and the cords relaxed, no vocal sound is produced, or at best nothing more than a hoarse whisper, audible only a short distance. But when the cords are closely approximated and at the same time rendered tense by the action of the laryngeal muscles, their edges are thrown into a state of rapid vibration by the passage of the air, and a vocal sound at once becomes audible. But the vocal sound is not directly produced by the vibration of the vocal cords. These cords are not, like the strings of a guitar or violin, simply extended between two opposite points and capable of vibrating freely in the interval. On the contrary, they are bands of elastic tissue attached throughout by their external surface, as well as at both ends, to the surrounding tissues, and only projecting inward as more or less flattened or rounded ridges at the level of the rima glottidis. In the opinion of some physiologists, it is the thin fold of mucous membrane on the internal surface of the vocal cords which forms the real vibrating edge in the vocal effort, while the cords themselves only constitute the necessary elastic basis for its attachment. Still it is evident that the approximation and elastic tension of the cords supply the primary and essential physical condition for the formation of the voice. The immediate cause of the production of the vocal sound is the vibration of the column of air itself, while passing out through the rima glottidis. The mechanism of the larynx as a vocal organ, therefore, seems to be analogous to that of a reed instrument, in which a column of air, passing forcibly through a narrow slit, bounded on one or both sides by a thin elastic plate of wood or metal, first causes the edge of the plate to vibrate with a sufficient rapidity, and is thus itself thrown into a state of sonorous vibration. In instruments of this kind, the tone or pitch of the sound produced varies with the length and width of the opening, the size of the vibrating plate, the force of the column of air, and the rapidity of the vibrations. With a wide opening, a large vibrating surface, and a moderately rapid passage of air, the vibrations will be comparatively slow and the sound produced of a deep or grave tone. With a narrow opening and a more rapid current of air the vibrations will be increased in frequency and the note produced will be acute or high-pitched. The same thing takes place in the formation of vocal sounds in the larynx. When the vocal cords are only partly approximated, their tension is incomplete and the vibrations allowed to take place along their whole extent, the voice has a grave sound; when they are closely approximated, reducing the rima glottidis to a comparatively short and linear slit and thrown into a high degree of tension, the voice becomes acute. Every variation between the two extremes of high and low notes is produced in this way, by alterations in the width of the rima glottidis and the length and tension of its vibrating edges. These variations are also aided by changes in the position of the entire

PHARYNGEAL-LARYNGEAL.

LARYNX, THE ORGAN OF VOICE. (Continued.)

larynx; the organ being usually carried downward toward the chest in the production of the lower notes and upward toward the head in forming the more acute sounds. The character or quality of the voice is also considerably modified by the conditions of tension or relaxation, moisture or dryness of the mucous membrane of the larynx, mouth, and fauces, and the variation in form of the cavities both above and below the glottis; but the actual production of the vocal sound invariably takes place in the larynx, its modifications from the above causes being always secondary.

From what has been said, it is evident that the formation of the voice depends upon the action of the laryngeal muscles, which move the arytenoid cartilages upon their articulations, and thus increase or diminish the width of the rima glottidis and the tension of the vocal cords. These muscles are animated by the recurrent laryngeal nerves, branches of the pneumogastric nerves, which come off from their parent trunks after these have entered the cavity of the chest, and then retrace their course from below upward through the deeper parts of the neck until they reach the level of the larynx. Hence their name of "recurrent" laryngeal nerves. If these nerves be *divided* by an operation, or *compressed* by an abscess, aneurism or tumor, so as to interrupt the nervous communication, the *voice is enfeebled or lost*, according to the degree of injury to the nerve and the consequent paralysis of the laryngeal muscles. The same effect is produced by injury or compression of the pneumogastric nerves of the neck, above the point where their recurrent laryngeal branches are given off. The voice is also affected by inflammation, thickening, ulceration, or sub-mucous infiltration of the tissues of the larynx; all these causes interfering with the necessary action of the laryngeal muscles and the formation of a vibrating fold of mucous membrane at the rima glottidis. There is only a form of hysterical affection in which the power of forming a vocal sound is temporarily lost, owing to a functional disturbance of innervation, and consequent failure of action in the laryngeal muscles. Loss of voice from any of these causes is termed *aphonia*, and is to be distinguished from *aphasia*, an affection of different origin, in which the patient retains the power of making a vocal sound, but is unable to remember the appropriate words or phrases necessary to communicate his ideas.—"American Cyclopædia."

FOR EXAMINATION OF THE LARYNX AND PHARYNX.

(RHINOSCOPY, see p. 207.)

Laryngoscopic Set, No. 1.

\$12.

- 1 Reflector, with Tiemann & Co.'s Head-band.
- 2 Laryngeal Mirrors.
- 1 Lente's Probe, silver.
- 1 Morocco Case, lined with velvet.

Laryngoscopic Set, No. 2.

\$18.

- 1 Reflector, with Tiemann & Co.'s Head-band.
- 1 Tongue Depressor, steel handle, japanned.
- 3 Laryngeal Mirrors, assorted sizes.
- 1 Sponge Holder, delicate.
- 1 Lente's Probe, silver.
- 1 Morocco Case, lined with velvet.

Laryngoscopic Set, No. 3.

\$23.

- 1 Reflector, with Tiemann & Co.'s Head-band.
- 2 Laryngeal Mirrors.
- 1 Church's Tongue Depressor, self-holding.
- 1 Uvula Hook, hard rubber.
- 1 Laryngeal Probe, silver or aluminium.
- 1 Sponge Holder.
- 1 Morocco Case, lined with velvet.

Laryngoscopic Set, No. 4.

\$26.

- 1 Reflector, with Head-band.
- 1 Church's Tongue Depressor, self-holding.
- 3 Laryngeal Mirrors, assorted sizes.
- 1 Simrock's Laryngeal Forceps.
- 1 Uvula Hook, hard rubber.
- 1 Laryngeal Probe, silver or aluminium.
- 1 Morocco Case, lined with velvet.

Lefferts' Examination Case, for Laryngoscopy and Rhinoscopy.

\$26.

- 1 Forehead Reflector, 3½ inch diameter, with Kramer's Head Band.
- 1 Laryngoscopic Mirror, No. 1.
- 1 Laryngoscopic Mirror, No. 5.
- 1 Tongue Spatula, folding.
- 2 Universal Handles, to fit the Laryngoscopic Mirrors and the Brush Holders.
- 1 Laryngeal Brush Holder and 6 Brushes.
- 1 Hard Rubber Powder Insufflator, with Rubber Tubing and Mouth Piece.
- 1 Neat compact Morocco Case.

PHARYNGEAL-LARYNGEAL.

LARYNGOSCOPES AND ACCESSORIES.*

On the Use of the Laryngoscope.

FIG. 2435.—Laryngoscope, with Head-Band.

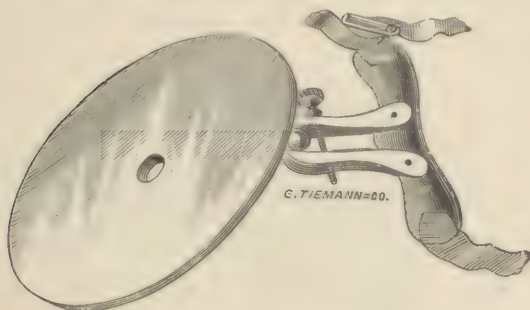
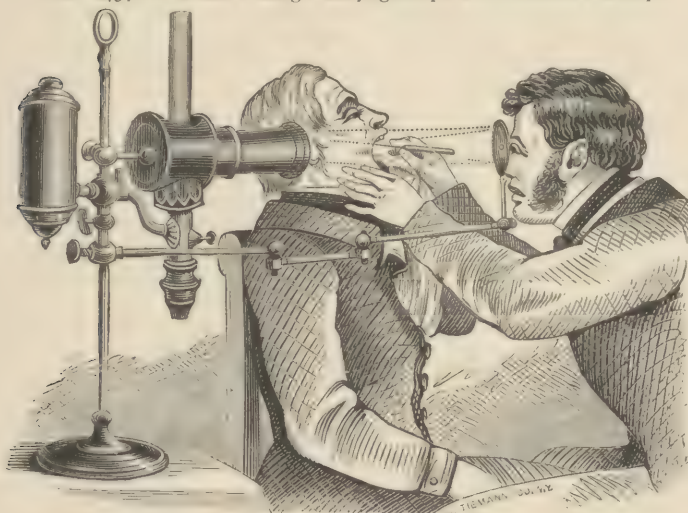


FIG. 2436.—Application of the Laryngoscope.



FIG. 2437.—Tobold's Large Laryngoscope and Student's Lamp.



Before speaking of laryngeal pathology as exhibited by the laryngoscope, let me say a few words anent the apparatus to be employed, the method of using it and the points to be observed.

What do you want to do? In plain English, you want to look around a corner into a dark hole. This sounds paradoxical, but the paradox is solved by the laryngoscope.

The light, either of the sun or of a lamp, is received on a mirror attached to the observer's forehead, from which it is reflected on to a small mirror which is introduced into the fauces of the patient, and from this mirror again the light is thrown down upon and into the larynx. The

angle of incidence being equal to the angle of reflection, you have merely to place your mirrors in such a relation to one another as to secure the proper direction of the rays of light, and a perfect and distinct image of the parts illuminated will be visible on the small mirror.

The sun cannot be relied upon at any hour of the day; and patients would not, even if the sun were always shining, present themselves when his rays penetrated a given locality. We therefore find it much more convenient to trust to artificial light altogether, and accordingly have recourse to a gas moderator or a paraffine oil lamp, which are not amenable to the caprices of the weather.

It is well to darken the room in which you make your examination; but even this is not absolutely necessary if the light is protected by a convex mirror on one side, and concentrated by one or more lenses on the other. Various apparatuses have been devised for the purpose of intensifying the light. The lamp should be placed close to the patient's head, on either side most convenient to the observer, and so that the lamp and the patient's and observer's heads are in the same horizontal plane. The patient, sitting erect, should push his head back so as to straighten the neck, and facilitate the introduction of the small mirror.

Before attempting to do this, the observer should first ascertain that the reflector is properly adjusted. If he finds that the mouth is fully illuminated, he may fairly conclude that he will be able to throw the light upon the fauces. Beginners generally find a little difficulty

* *Speculum Laryngis*: also called *Pharyngoscope*, according to its employment.

PHARYNGEAL-LARYNGEAL.

LARYNGOSCOPES AND ACCESSORIES.

On the Use of the Laryngoscope. (Continued.)

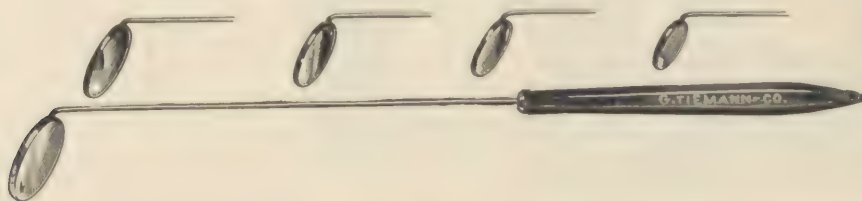
FIG. 2438.—Schrötter's Laryngoscope, with Nasal Rest.



in adjusting the reflector, but this is speedily surmounted. Whether you place your mirror on your forehead, or whether you prefer to use it fixed to a lamp, is a matter of little moment. Try both ways, and adopt the one you like best. The mirror I employ has a central uncovered spot. It is an improvement upon the original mirror employed by the father of laryngoscopy, Professor Czermak. I admit that with Professor Czermak's instrument I had a difficulty in seeing through the central orifice, but with this modification I find it advantageous first to adjust the reflector so that I am enabled to see the fauces through the opening, with the eye covered with the reflector, and then I am certain to have the proper axis for both eyes. After you have satisfied yourselves that the lamp and the reflector (which is fixed on the head by an elastic band passing

over the forehead) are in the right position, tell your patient to open his mouth widely, to protrude the tongue, and to breathe freely. Some patients will permit you to see into their larynx without in any way fixing the tongue, but this is the exception. As a rule, it is necessary that the patient, or the observer, should take hold of the tip of the tongue with a handkerchief or towel, or to use a tongue depressor, to prevent this "unruly organ" from slipping back. Without this precaution, you very often fail in your endeavors to see below the epiglottis. Your next step, after having got your patient in the proper position, is to warm the laryngeal mirror. This is necessary to prevent the vapor of respiration being precipitated on, and dimming the mirror; but take care not to overheat it. As a precaution, it is well to test the temperature by applying the back of the mirror to your own cheek.

FIGS. 2439.—Laryngoscopic Mirrors.



Take hold of the stem of the mirror as if you were holding a pen; introduce it into the mouth without touching the tongue, teeth, or lips, sinking the hand at first, and then raising it gradually, so as to allow the mirror to form a curve until it reaches the uvula. Almost the whole secret of the manipulation in laryngoscopy consists in this. If you touch the lips or teeth, you tease the patient, but if you touch the tongue, you are certain to excite reflex action, and the root of the tongue will arch up to impede your view. *Audacem fortuna juvat*. Push your mirror, after having passed the janitors, well against the uvula, and you will rarely meet with any serious impediment in getting a proper view of the larynx. An unsteady hand creates difficulties which need not exist, by bringing the mirror into contact with other parts than the uvula and soft palate. These are not very sensitive, but if you tease the root of the tongue, or the arches of the palate, you infallibly excite reflex action, which will necessitate the withdrawal of the instrument. Having placed your mirror at an angle of about 45° with the horizon, it is well to rest the little finger of the right hand against the patient's cheek, by which means you will steady the instrument. You then secure a proper illumination of the laryngeal mirror, and by the necessary manipulation, which practice alone can teach, you successively examine all the parts exposed to view.

In making the examination and recording the facts observed, you must remember that you are looking into a mirror, which represents the parts in a different relation from their real position. The epiglottis, which in nature is turned from the observer, is represented as opening towards him; the base of the tongue, which is in front of the epiglottis, appears in the mirror behind it; and the vocal cords equally occupy in the mirror a reversed position from that which they really possess. As laryngoscopic illustrations represent the appearances as seen in the mirror, it is necessary to remember the true relation, in order to understand the drawing correctly. The lateral relations will cause less difficulty than the antero-posterior relations. What ordinarily appears to be the left or right, in the subject of observation placed before us, still continues so. We readily make the necessary allowances here from the habit engendered by custom; but it is different

PHARYNGEAL-LARYNGEAL.

LARYNGOSCOPES AND ACCESSORIES.

On the Use of the Laryngoscope. (Continued.)

FIG. 2440.—Mackenzie's Light Concentrator.

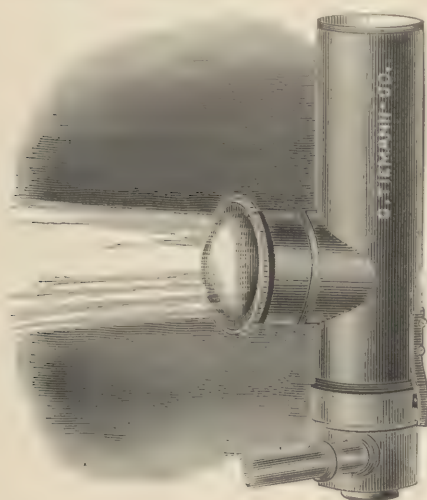


FIG. 2441.—Simrock's Laryngoscope.

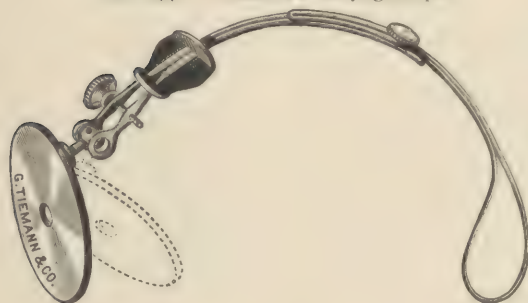


FIG. 2442.
Cresswell-Baber's
Pocket Laryngoscope.



in regard to objects placed in front of each other, and reflected in a mirror, because for this our daily life offers us fewer precedents. Perhaps the easiest way to realize the position of the parts as seen in the mirror, is to imagine yourselves looking at the epiglottis and vocal cords through a hole in the cervical portion of the vertebral column. To the beginner I would say, make your first experiment upon a case in which you are informed there is no special difficulty; remember the rules laid down; bear in mind the anatomy of the parts, and the direction in which you wish to carry the light; and, with a light and steady hand, you will scarcely fail, after one or two attempts, to see that which is ordinarily visible by the aid of this instrument.

Now, what are you to look for? The first point that always attracts the attention of the observer, after having got the light and the mirror duly placed, is the epiglottis. It is the Cape of Good Hope of the laryngoscopists, and it is at times a difficult matter, a very difficult matter, to round the Cape. You will find that it varies as much in form as the nose, and its position not unfrequently is so prone as to render a good view of the subjacent parts almost an impossibility. Then, too, in irritable persons, it undergoes a variety of contortions and contractions, which give it character for muscularity greater than anatomists show it to possess. Still, as a rule, it serves

merely as a land-mark anatomically and pathologically; anatomically, because its well-known relations tell you in what direction to look for more important organs; pathologically, because the appearance of the mucous membrane covering the epiglottis is often a valuable indication as to the state of the subjacent parts. Examine the epiglottis carefully, the form, the color, the attachments. It should be perfectly smooth, of a pale, yellowish rose hue, and symmetrical. Look at the fossa formed by the front of the epiglottis with the base of the tongue, and note the state of any secretions upon or near the epiglottis. In disease you will see its color varying from the dull white of anæmia to every shade of uniform, or streaky and patchy redness.

It may present ulcers of varying size and depth; it may be deformed by old cicatrices or congenital malformation; tumefaction from inflammatory or oedematous thickening of the mucous and submucous layers may present itself; and it may exhibit extravasations of blood, or be more or less bathed in pus, or covered with a mucous secretion. Similar conditions may be discovered in the glotto-epiglottid fossa, or on the glotto-epiglottid folds. In order to see the parts subjacent to the epiglottis, you will have to depress the handle of your mirror somewhat, so as successively to illuminate the posterior surface of the epiglottis; the arytenoid cartilages, with the corpuscula Santorini and Wrisbergii; the superior thyro-arytenoid folds, or the false vocal cords, as they are also called; and, by turning the mirror laterally, you will examine the right and left sides of the introitus laryngis, and especially the state of the ventricles of the larynx. These are cul-de-sacs intervening between the vocal cords proper, and the superior thyro-arytenoid folds. The state of the ventricles has an important bearing on the production of the voice, inasmuch as their patulousness is essential to the free vibration of the vocal cords and the due production of the voice. If the mucous membrane of the ventricles is swollen, the pitch and sonorousness of the voice is interfered with, and, the more the pouch is obliterated, the greater will be the interference with phonation. It is here that various secretions form and accumulate, and you will readily understand why these should more or less affect the voice, as they present obstacles to the passage of the air, or diminish the vibrations of the aerial pulse. If the secretions are viscid, you may at times be puzzled by strings of mucus extending across the entrance of the larynx, closely simulating the vocal cords

PHARYNGEAL-LARYNGEAL.

LARYNGOSCOPES AND ACCESSORIES.

On the Use of the Laryngoscope. (Continued.)

FIG. 2443.—Henry's Bull's-Eye Illuminator.

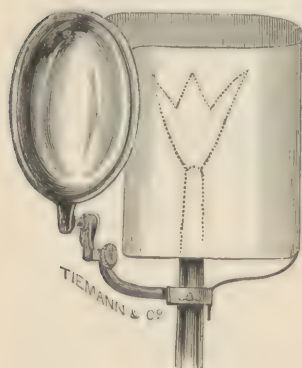
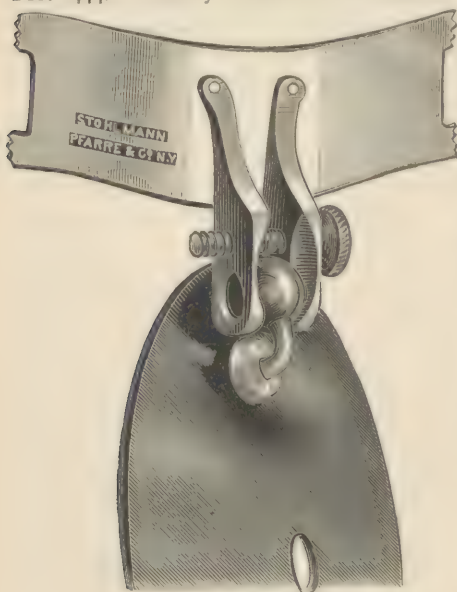


FIG. 2444.—Pomeroy's Reflector and Holder.



palpable results elsewhere, here affects the comfort, the occupation, the life of the patient, and is therefore well deserving the study of the practitioner by any additional physical means that may be placed at our disposal. Here, too, we have a good illustration of the difference between vital morbid conditions and the condition of the same parts as seen after death; a difference that you should always bear in mind, as you may otherwise easily be misled into a wrong interpretation of the phenomena presented on the post-mortem table. If you had merely seen the interior of a larynx, removed from the body, you would scarcely anticipate the marked contrast that exists in life between the vocal cords and the adjacent parts, nor would it be possible satisfactorily to determine the mode in which the variations of sound are produced by the vocal cords. You will find that there was much uncertainty as to the theory to be adopted regarding vocalization, even in Müller's time; and it was not until after the practical introduction of the laryngoscope by Czermak, that the study became satisfactory and the conclusions definite. If I name Czermak, it is not because I do not appreciate the labors of others in this field; but whatever others have done, he certainly has

themselves. Little patches of secretion may also simulate ulcers. The sponge or brush will readily remove such secretions, and show the condition of the subjacent membrane. The ventricles, moreover, are the frequent seat of morbid growths. All these points having been noted, you seek the vocal cords themselves.

In a healthy larynx the vocal cords stand out, with a clear pearly sheen which is peculiarly characteristic. Once seen, the appearance is not to be forgotten; and you will often, in doubtful cases of laryngeal disease, rejoice at recognizing this striking feature, because it will prove that the most important part involved in phonation (so far as the larynx is concerned) is healthy. The vocal cords, or inferior thyro-arytenoid ligaments, are mainly composed of yellow elastic tissue, but are endowed with the most marvelous capability of minute vibratile adjustment, subject to the controlling power of the will, exercised through the arytenoid, thyro-arytenoid, crico-arytenoid, and other muscles. It has been calculated that no less than one hundred muscles are brought into action in the ordinary modulation of the voice, but the note which is uttered depends upon the exact degree of tension of two ligaments, at the utmost seven lines in length, which is mainly

determined by the two sets of muscles mentioned. You will have a measure of the minuteness of this adjustment when you reflect, that a practiced singer is capable of uttering three hundred different notes at will, for each of which, on this minute vibrating cord, a different stop must be applied.

The vocal cords are covered with mucous membrane, distinguished from the mucous membrane of the rest of the larynx, which is ciliated, by being squamous. The mucous membrane overlies the elastic tissue of the cords, and is liable—though to a much less extent than the mucous membrane in the vicinity—to congestion, and the various morbid changes which are seen in this tissue elsewhere. An accurate knowledge of the anatomy and physiology of the parts will enable you more fully to appreciate the importance of minute shades of difference in the appearance of the parts. A roughness of the surface or a discoloration, which would lead to no

FIG. 2445.—Elsberg's Pocket Laryngoscope.



PHARYNGEAL-LARYNGEAL.

LARYNGOSCOPES AND ACCESSORIES.

On the Use of the Laryngoscope. (Continued.)

compelled us all, by the demonstration of the comparative facility of laryngoscopic examination, to make it a part of our medical studies.

It would be an injustice, in speaking of the subject, not to mention the name of M. Garcia, a well known singer and amateur physiologist, who established by laryngoscopic examination much that is now known as to the physiology of the larynx before Czermak had made known his method; but the pearl that M. Garcia discovered was not appreciated by our profession, and therefore, so far as the medical world are concerned, laryngoscope remained an unknown quantity until the appearance of Czermak's monograph.

It is not my object, for the present, to do more than to interest you in the practical employment of the laryngoscope in the recognition and treatment of disease; therefore I do not attempt to lay before you an account of laryngeal physiology—a branch of science which is capable of further development, and which some of you may feel called upon to promote. Allow me yet to revert to a few points connected with the pathology of the larynx, to which I would draw your attention, as illustrating the value of this mode of investigating disease. The practical examination of the numerous cases that present themselves in our hospital, will serve to impress upon your memory and comprehension

FIG. 2446.—Pocket Illuminator.

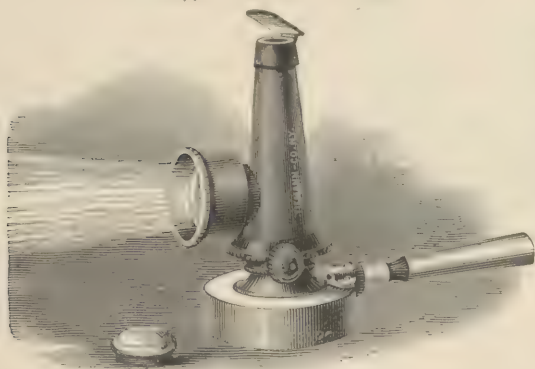
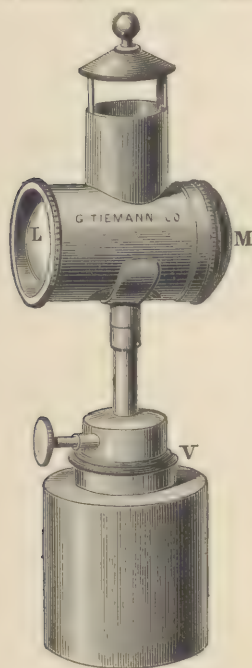


FIG. 2447.—Collins' Lamp.



more vividly what I now merely show you *veluti in speculo*.

I have spoken of various morbid changes seen in or near the vocal cords, showing increased or diminished vascularity, congestive or oedematous swelling, ulceration, cicatrices, growths, all of which I have myself seen. If you consider the muscular and the nervous functions of the parts, you will expect to see these also materially affected by disease. The *plus*—evinced by spasm—is not likely to be very visible, because it will not leave you time for anything but immediate action to relieve your patient: but the *minus* of paralytic conditions is frequently observable in the irregular action, or want of action, of one or both vocal cords. It is here that stimulation, and notably the direct application of galvanism, is often of palpable benefit. And you will not examine many larynges before you will satisfy yourselves of the perfect facility with which you may direct the galvanic current, as well as any other medicinal application, to any given part of the larynx.

I have not, however, quite done yet. You may see further than the vocal cords. Their under surface can at present only be examined when there is a hole in the trachea, and at least one instructive instance is on record where this mode of exploration was practiced with much benefit to the patient. But these are refinements of practice upon which it is unnecessary to dwell. I now merely speak of the ordinary employment of the laryngoscope, and I wish to remind you, that having explored the entrance to the larynx and the vocal cords, you should examine, as far as may be, the trachea. It is generally easy to recognize several rings of this tube, and you may, when the larynx is capacious and the patient steady, penetrate to the very bifurcation of the trachea. The only morbid conditions that I have definitely recognized in the trachea, have been scattered ulcers; but it is manifest that, especially in those cases in which foreign bodies have slipped through the glottis, the discovery of their exact site by the laryngoscope may, as it already has been, prove of great practical value to the surgeon.

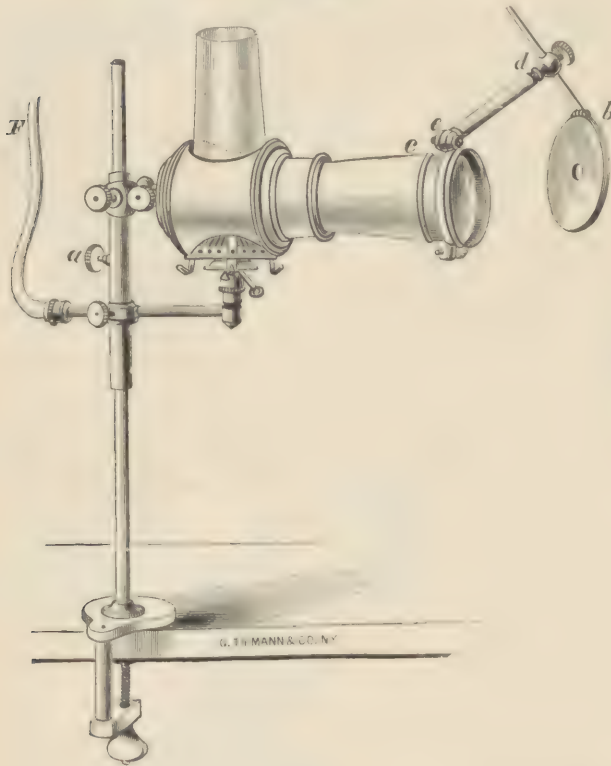
There is no better mode of initiating yourself into the practice of laryngoscopy than to examine your own larynges, or those of your fellow-students. By this kind of exertion, you will familiarize yourself with the use of the instrument, no less than the healthy condition of the parts. M. Garcia's interesting observations were entirely the result of examination made upon his own vocal cords, and as there is room for a further cultivation of this field of physiology, each of you may be enabled to advance science in this direction. But apart from this, the mere dexterity of manipulation will be increased by the practice recommended, and if you know from experience in your own persons how to behave, you will more readily advise your patients what to do, and sympathize with their difficulties. Not every one, however, is a suitable subject for autolaryngoscopy; the

PHARYNGEAL-LARYNGEAL.

LARYNGOSCOPES AND ACCESSORIES.

On the Use of the Laryngoscope. (Continued.)

FIG. 2448.—Seeger's Modification of Tobold's Laryngoscope, for Gaslight.



narrowness of the introitus laryngis and the prone condition of the epiglottis, no less than an unusual irritability of the parts, frequently render the process extremely difficult. Various methods have been suggested for the removal of undue irritability, such as the inhalation of small quantities of chloroform, the application of bromide of potassium, or the use of astringent gargles. Every now and then, even after you have acquired sufficient dexterity in the use of the instrument, you will meet with cases which present insuperable difficulties. You are then no worse off than your predecessors were without the laryngoscope. You will have to fall back upon those other symptoms which your knowledge of physiology and pathology will teach you to appreciate, and which this instrument is not intended to supersede."—By Dr. E. H. Sieveking, Physician in Ordinary to the Prince of Wales, and to St. Mary's Hospital. *Lancet*, April 8, 1865, page 360.

FIG. 2449.
Laryngeal Mirrors and
Universal Handle.



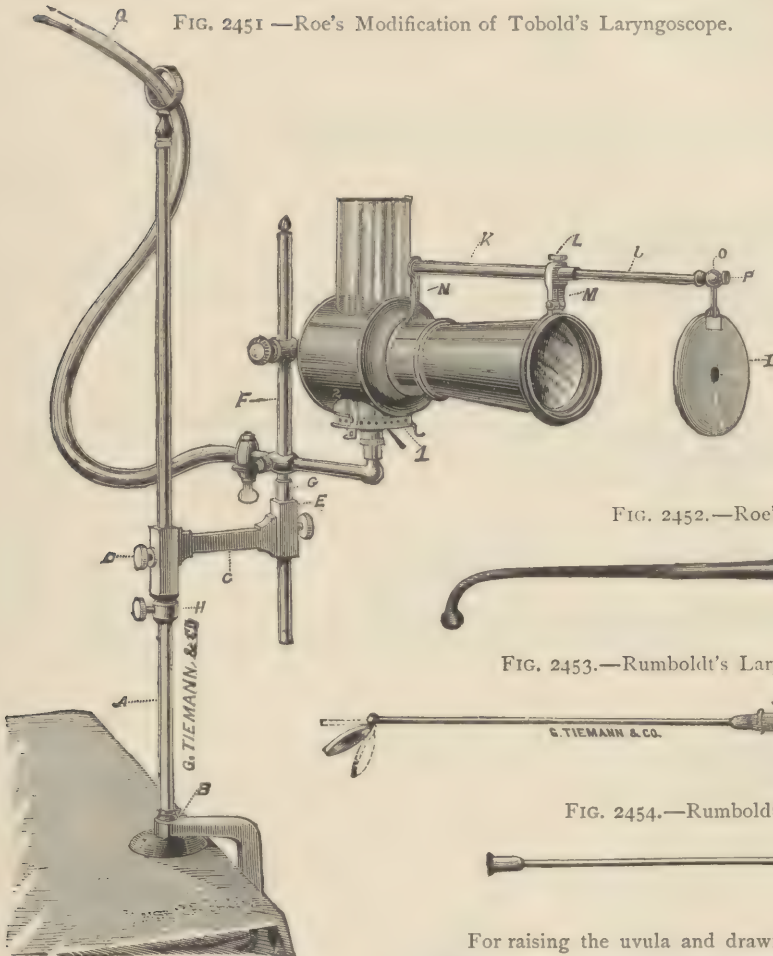
FIG. 2450.—Lefferts' Examination Case, for Laryngoscopy and Rhinoscopy.



PHARYNGEAL-LARYNGEAL.

LARYNGOSCOPES AND ACCESSORIES.

FIG. 2451.—Roe's Modification of Tobold's Laryngoscope.



UVULA OR PALATE HOOKS:

Voltolini's, p. 208.

Fraenkel's, p. 208.

Czermack's, p. 208.

Jarvis', p. 208.

Lefferts', p. 250.

TONGUE DEPRESSORS, p. 238.

FIG. 2452.—Roe's Uvula Hook.



FIG. 2453.—Rumboldt's Laryngeal Mirror.



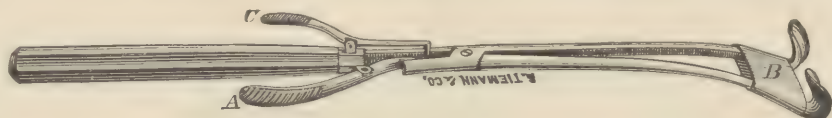
FIG. 2454.—Rumboldt's Uvula Retractor.



For raising the uvula and drawing it slightly forward, in order to obtain a more extended view of the cavity above. A tube six inches long and one-eighth of an inch in diameter, having at one end an enlargement three-sixteenths of an inch transversely, and cup-shaped, for the purpose of receiving the uvula. The other extremity is trumpet-shaped, and one inch in diameter, and covered by sheet india rubber. The smaller extremity is applied gently to the uvula, whilst the air is expelled from the tube by slight pressure on the rubber extremity. Relieving the pressure draws the uvula into the tube about one-quarter of an inch. Only slight traction is now necessary to lift the uvula and draw the soft palate forward. If carefully handled, patients hardly feel the application.

The instrument resembles the ordinary palate-hook, split *longitudinally*. The surface of each hook that comes in contact with the soft palate is made convex by binding the blades. The arms are separated by a

FIG. 2455.—Rumboldt's Spreading Soft-Palate Retractor.



lever (A) on the handle, and are maintained in this expanded condition by a retainer or wedge—connected with another lever (C) having a spring under it—which insinuates itself between them. The uvula is prevented from dropping into the operator's way by a small piece of india rubber tubing (B) slipped on the arms over the hooks, which also answers to close the hooks on raising the wedge (C). Equal retraction of the velum palati—with both relaxation and tension at will—can be effected by the instrument held in the left hand, while the right is engaged in operating.

PHARYNGEAL-LARYNGEAL.

PROBES,

For Making Exploration by the Sense of Touch.

SPONGE HOLDERS AND BRUSHES,

For Local Application of Remedies in Solution to the Mucous Membrane of the Throat.

FIG. 2460.—Granger's Sponge Holder.



See "ELSBERG'S
ÆSTHESIOMETER,"
page 11.

FIG. 2457.—Finger Sponge Holder.



FIG. 2456.—Mackenzie's Laryngeal Probes.

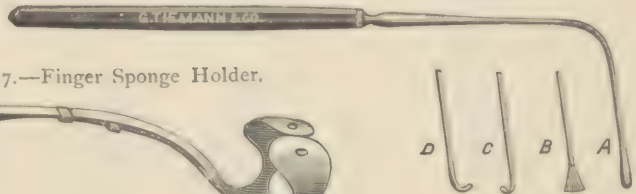


FIG. 2458.—Mackenzie's Laryngeal Brushes.

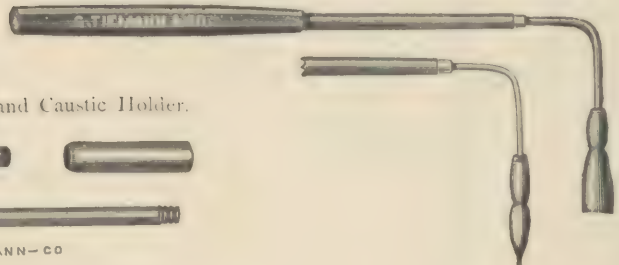
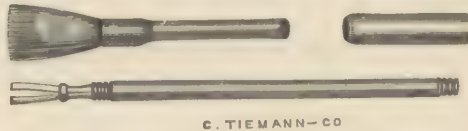


FIG. 2459.—Child's Brush and Caustic Holder.



C. TIEMANN & CO

FIG. 2461.—Buck's Sponge Holder.



FIG. 2462.—Seeger's Brush Holder.



FIG. 2463.—Noyes' Laryngeal Brush Holder.

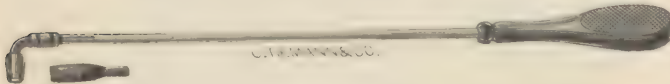


FIG. 2464.—California Sponge Holder.

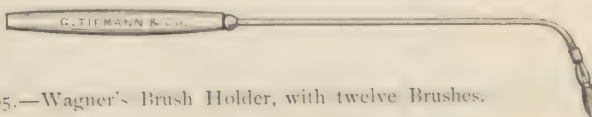
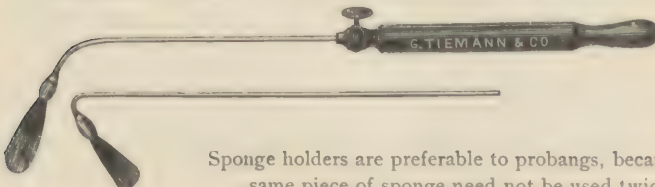


FIG. 2465.—Wagner's Brush Holder, with twelve Brushes.



Sponge holders are preferable to probangs, because the same piece of sponge need not be used twice.

FIG. 2466.—Ruppaner's Brush Holder.



FIG. 2467.—Lefferts' Laryngeal Brush Holder.



PHARYNGEAL-LARYNGEAL.

SPONGE HOLDERS, DROP TUBES, SYRINGES, INSUFFLATORS.

For Local Application of Solutions and Pulverized Remedies in Diseases of the Throat.

FIG. 2468.—Mackenzie's Sponge Holder, with Safety Wedge.

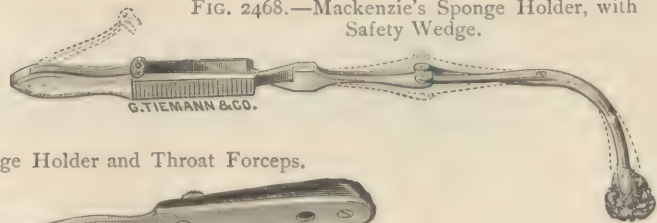


FIG. 2469.—Elsberg's Sponge Holder and Throat Forceps.

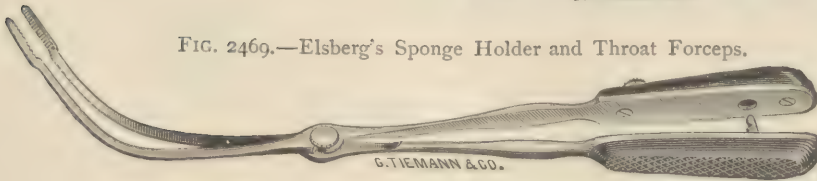


FIG. 2470.—Hard Rubber Laryngeal and Posterior Nares Syringe.



FIG. 2471.—Hartwell's (Stærk's) Drop Tube.

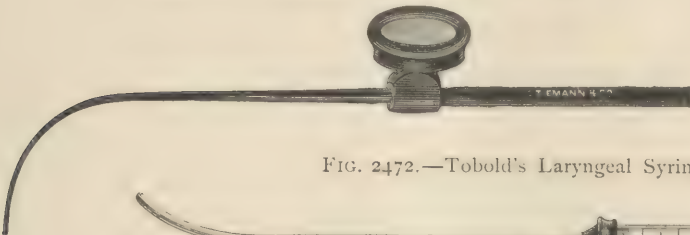


FIG. 2472.—Tobold's Laryngeal Syringe.



FIG. 2473.—Lefferts' Powder Blower.

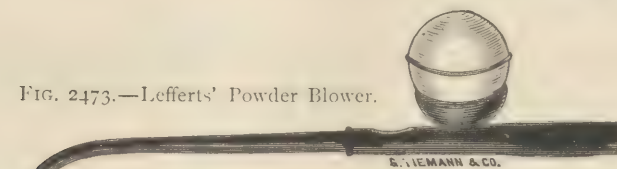


FIG. 2474.—Elsberg's Insufflator or Powder Blower.

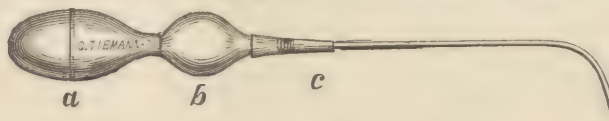


FIG. 2475.—Rauchfuss' Powder Blower, with Mouth-piece.

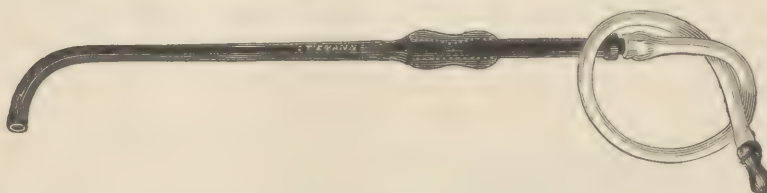


FIG. 2477.—Gibb's Spray.

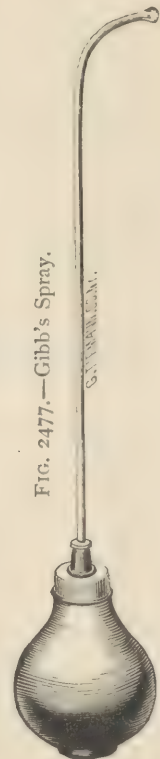


FIG. 2476.—Laryngeal Powder Blower, Hard Rubber.



The pistons of all syringes used for the application of solutions should be kept in proper order, by frequent oiling, and by renewing the leather packing whenever it becomes too loose.

PHARYNGEAL-LARYNGEAL.

For the Local Application of Pulverized Remedies and Solid Escharotics, in Diseases of the Throat.

FIG. 2478.—Clay's Powder Insufflator.



The method of using solid nitrate of silver in a *porte caustique* is dangerous, because the piece of caustic is apt to break and drop into the larynx or trachea.

Solid nitrate of silver is best applied by means of Lente's or other probes. The manner of charging the probe is to melt the nitrate over a spirit lamp in the platina cup, then, after having well cleaned the bulb of the probe, to dip it in and out of the nitrate until a sufficient coating for the application has adhered to it. It then clings so closely that a blow from a hard instrument is required to detach it—making the application perfectly safe.

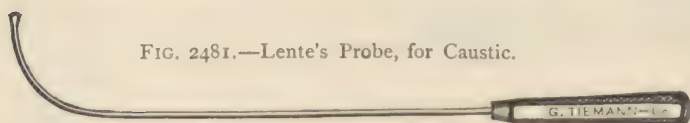
FIG. 2479.—Lente's Platina Cup, for Fusing Nitrate of Silver.



FIG. 2480.—Laryngeal Caustic Carrier, Concealed.

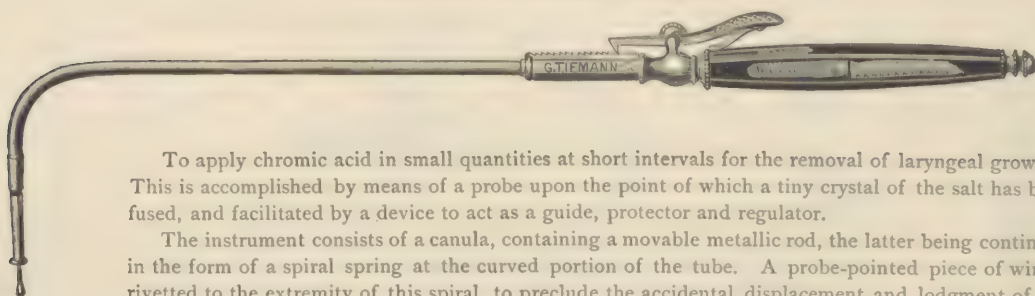


FIG. 2481.—Lente's Probe, for Caustic.



See "GALVANO CAUTERY," page 38.

FIG. 2482.—Jarvis' Laryngeal Applicator.



To apply chromic acid in small quantities at short intervals for the removal of laryngeal growths. This is accomplished by means of a probe upon the point of which a tiny crystal of the salt has been fused, and facilitated by a device to act as a guide, protector and regulator.

The instrument consists of a canula, containing a movable metallic rod, the latter being continued in the form of a spiral spring at the curved portion of the tube. A probe-pointed piece of wire is rivetted to the extremity of this spiral, to preclude the accidental displacement and lodgment of the caustic-carrier in the larynx. The spring also serves as buffer to deaden the force of the probe's impact against the growth.

The handle of the applicator is excavated to receive a spiral spring, acting upon the movable rod. A detent drops between the teeth and sets the spring. The nut serves to regulate the tension of the spring. When not in use, the stylet projects beyond the hood, thus permitting fusion of the chromium crystals upon it as with the ordinary probe.

When ready for use the probe's point is drawn within the tube by traction upon the milled nut, its return being prevented by the catch. The applicator can now be introduced without risking the loss of the application upon accidental points of contact.

It is not necessary to carry the end of the instrument directly upon the growth, since the probe-point is propelled some distance beyond the end of the tube, thus bridging over the interval of alarm.

A special feature of the instrument is the trigger device. This contributes the utmost steadiness, and therefore precision in manipulation, by securing instantaneous action with the smallest expenditure of force. The extremity of the probe is made of flexible metal, to permit its fixation at any angle."—From a paper read at the Sixth Annual Session of the American Laryngological Association, May 13, 1884. By Dr. William Chapman Jarvis.

PHARYNGEAL-LARYNGEAL.

For Scarifying the Mucous Membrane in Œdema, the Evacuation of Cysts and the Removal of Pharyngeal and Laryngeal Growths.

FIG. 2483.—Mackenzie's Laryngeal Lancet, with Three Blades.



FIG. 2484.—Schroetter's Laryngeal Lancet and Forceps.

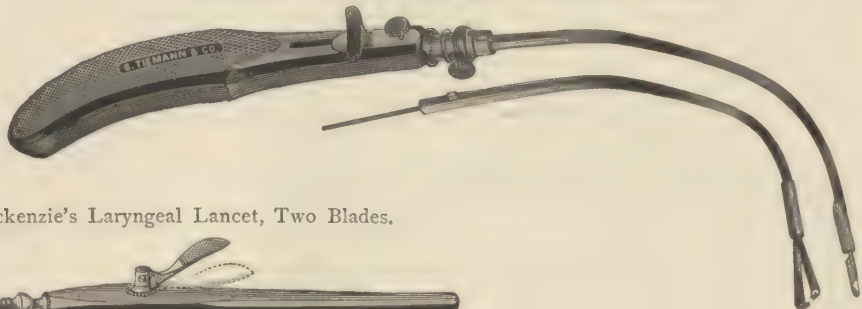


FIG. 2485.—Mackenzie's Laryngeal Lancet, Two Blades.

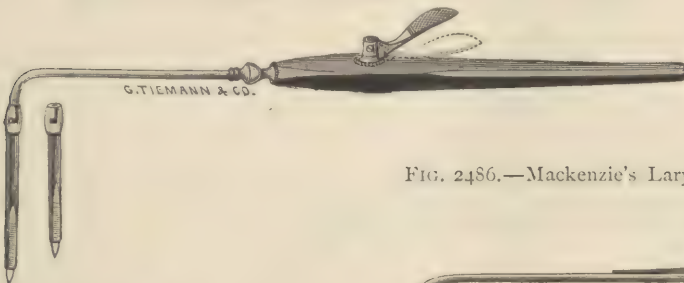


FIG. 2486.—Mackenzie's Laryngeal Forceps, Scissors and Ecraseur.

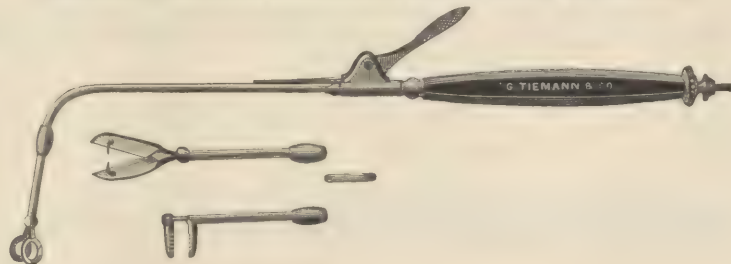


FIG. 2487.—Tobold's Concealed Laryngeal Lancet.

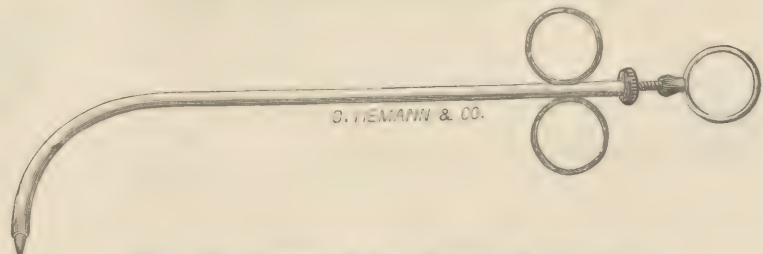
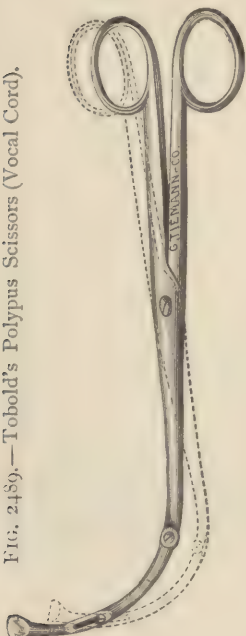


FIG. 2488.—Tiemann & Co.'s Scissors, Movable Points.



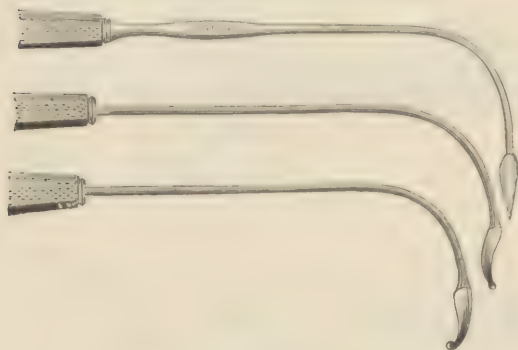
FIG. 2489.—Tobold's Polypus Scissors (Vocal Cord).



PHARYNGEAL-LARYNGEAL.

For Scarifying the Mucous Membrane in Œdema, Dilating the Larynx and for the Removal of Pharyngeal and Laryngeal Growths.

FIGS. 2490, 2491, 2492.—Tobold's Laryngeal Knives.



See SNARES,
"JARVIS," page 214.
"BOSWORTH'S," page 215.
"BETTMAN'S," page 215.
"GALVANO-CAUTERY,"
page 38.

FIG. 2493.—Grant's Œdema Glottis Instrument.



FIG. 2494.—Rumbold's Laryngeal Forceps and Scissors, for Removing Laryngeal Tumors.

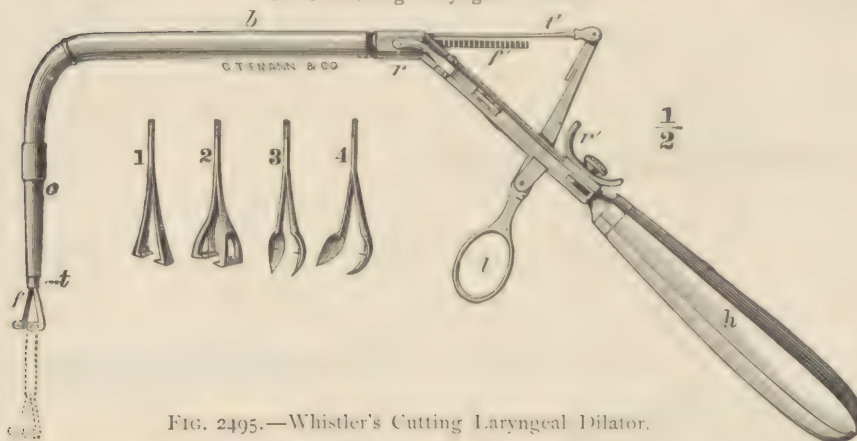
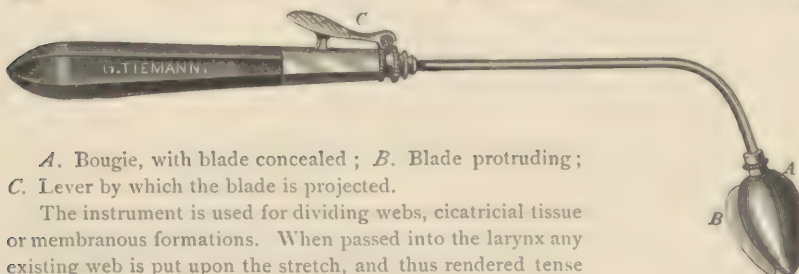


FIG. 2495.—Whistler's Cutting Laryngeal Dilator.



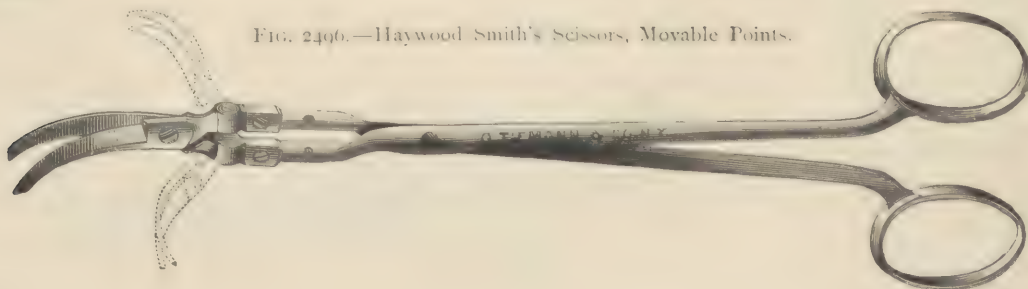
A. Bougie, with blade concealed; B. Blade protruding;
C. Lever by which the blade is projected.

The instrument is used for dividing webs, cicatricial tissue or membranous formations. When passed into the larynx any existing web is put upon the stretch, and thus rendered tense for division.

FIG. 2497.—Gibbs' Laryngeal Ecraseur.



FIG. 2496.—Haywood Smith's Scissors, Movable Points.



PHARYNGEAL-LARYNGEAL.

For Paralysis of the Vocal Cords and for the Removal of Foreign Bodies and Neoplasms from the Pharynx, Larynx, Trachea and Gullet.

FIG. 2498.—Mackenzie's Laryngeal Electrode, for Paralysis of the Vocal Cords.



This is so constructed that the current does not pass till the metal point or sponge is in contact with the vocal cords. The instrument is held in the hand between the thumb and second finger, and when the point has been placed in the desired position, the operator, with his index finger, presses on the key in the handle, when the electric current

passes through the larynx to the skin externally. At the same time the patient has to wear a necklet, Fig. 1166, with which the other wire of the battery is connected. See also page 34.

FIG. 2499.—Brun's Epiglottis Pincette, for holding a too large or pendant Epiglottis forward while the Laryngeal Mirror is in position, to get a view of the interior of the larynx.

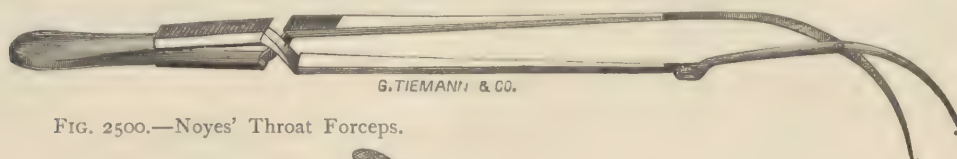


FIG. 2500.—Noyes' Throat Forceps.



FIG. 2501.—Simrock's Laryngeal Forceps, for Extracting Polypi and Foreign Bodies and for holding Sponge and Camel's-hair Brushes.

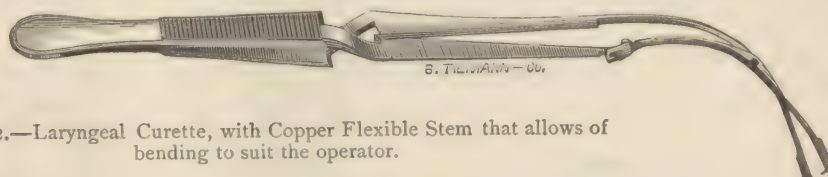


FIG. 2502.—Laryngeal Curette, with Copper Flexible Stem that allows of bending to suit the operator.



FIG. 2503.—Fauvel's Laryngeal Polypus Forceps.

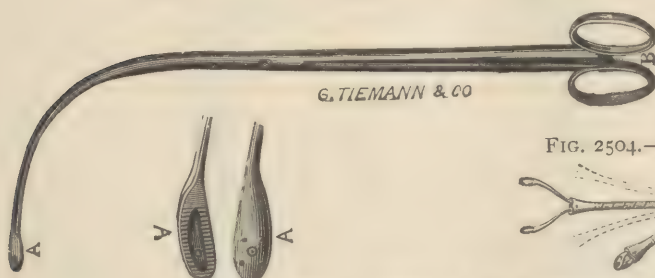


FIG. 2504.—Tiemann & Co.'s Flexible Throat Forceps.

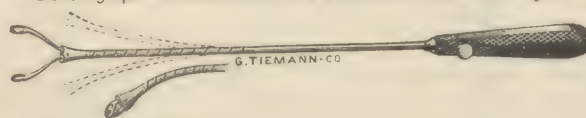


FIG. 2505.—Tiemann & Co.'s Laryngeal Scoop.



PHARYNGEAL-LARYNGEAL.

For the Removal of Foreign Bodies and Neoplasms from the Pharynx, Larynx, Trachea and Gullet.

FIG. 2506.—Fauvel's Throat Forceps.

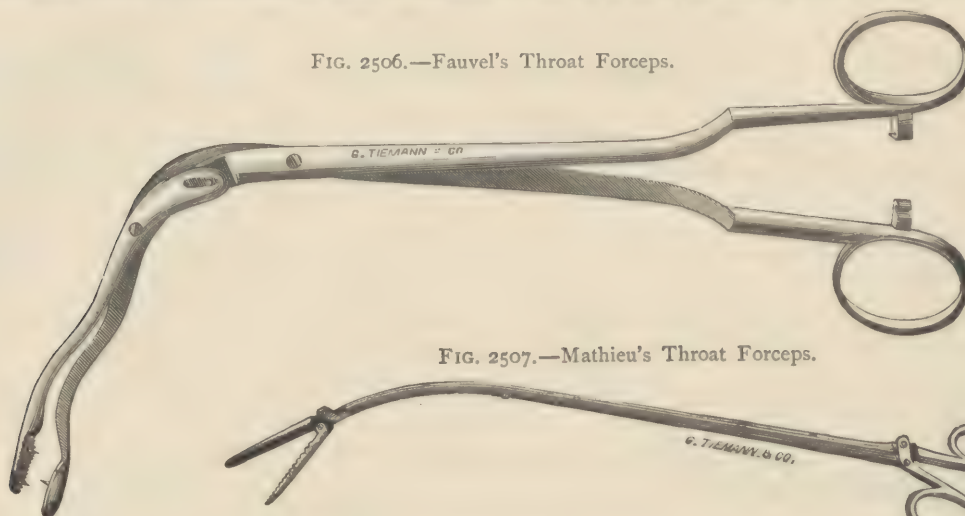


FIG. 2507.—Mathieu's Throat Forceps.

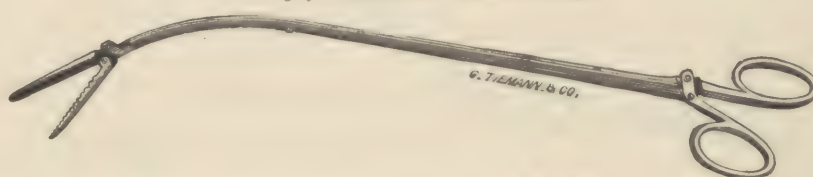


FIG. 2508.—Burge's Throat Forceps.

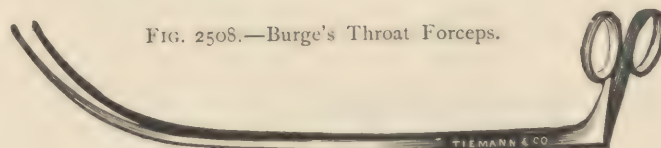


FIG. 2509.—Mackenzie's Lateral Throat Forceps.

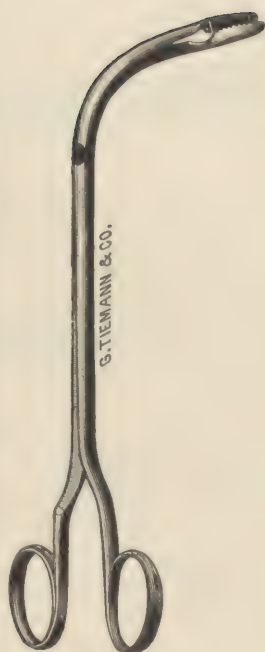


FIG. 2510.—Buck's Throat Forceps.

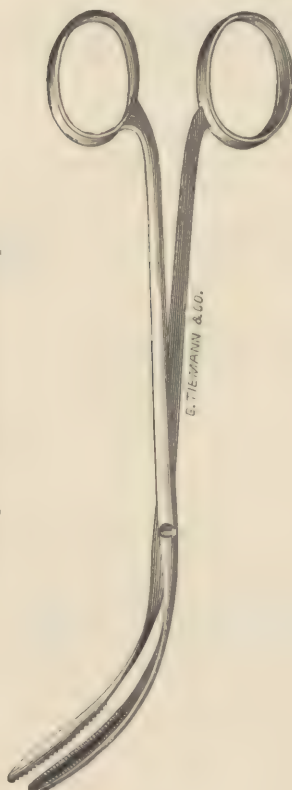


FIG. 2511.—Mackenzie's Antero-Posterior Throat Forceps.



LARYNGO-TRACHEAL.

Surgical Anatomy of the Laryngo-Tracheal Region.

"The space may be regarded as bounded on each side in the upper part by the sterno-hyoid muscles, and in the lower part by the sterno-thyroid muscles, whilst the superior border of the thyroid cartilage above and the upper edge of the sternum below may be considered as the possible limits of the region within which the air tube can be opened. Owing to the directions of the sterno-thyroid muscles, the space is slightly narrower below than above. It is true that an opening can be made at a higher level, *i. e.*, through the thyro-hyoid membrane; but in that case it is the pharynx which is laid bare. Division of the thyroid cartilage may also be practiced, but this operation is very rarely performed, except for the removal of a body impacted in the larynx or for the extirpation of a neoplasm which cannot be got rid of by an endolaryngeal method. Even when a foreign body is firmly fixed, however, it can almost always be dislodged through an opening in the air-passage below the level of the thyroid cartilage; and the great importance (in relation to the vocal function) of maintaining the absolute integrity of this portion of the larynx cannot be too strongly insisted on."—"Diseases of Pharynx, Larynx and Trachea." Mackenzie. American edition. 1880.

Infra-Glottic Laryngoscopy.

"Where tracheotomy has been performed, and a fenestrated canula is worn, a very minute mirror may be introduced through the tube, with its face directed upward; or the canula may be removed and the mirror passed into the wound. In this way the observer obtains a view of the larynx from below. * * * This mode of examining the larynx, though of very limited application, is valuable, because it generally happens—in cases where a canula is worn, and air is inspired mainly through the trachea—that the epiglottis does not rise up, but remains pendent in inspiration. In post-tracheotomy cases, also, it often happens that the epiglottis is bound down over the larynx by old cicatrices, and consequently ordinary laryngoscopy is useless. It is well to remark that the vocal cords, when observed from below, have a reddish color, and do not present the peculiar white appearance which is seen when the laryngeal mirror is placed on the uvula."—"Diseases of the Pharynx, Larynx and Trachea." Mackenzie. 1880.

Laryngo-Tracheal Instruments, Brushes, Forceps, &c.

"The various laryngeal instruments can be employed in treating disease of the trachea, but the brushes and sponge holders, if used, require to be longer below the angle. In tracheal affections insufflators are of great service, the same instruments being applicable for the purpose as those for the larynx, as inhalations and sprays. The common laryngeal forceps, however, can seldom be introduced into the windpipe, though the tube-forceps will be found useful in extracting foreign bodies—especially through an opening in the trachea."—Mackenzie.

LARYNGO-TRACHEAL STENOSIS.

FIG. 2512.—Mackenzie's Laryngeal Dilator.

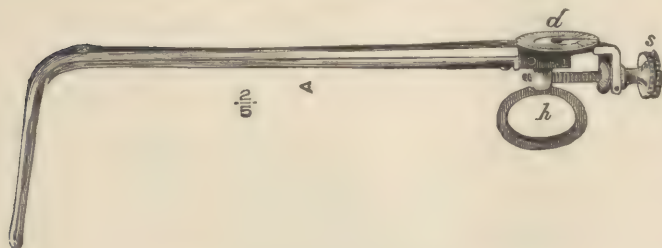
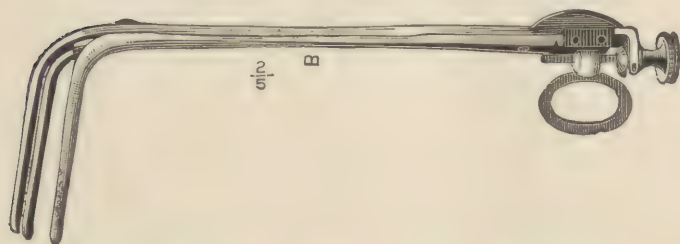


FIG. 2513.—Mackenzie's Laryngeal Dilator.



"For dilating the larynx when it has become blocked up by organized membrane or by cicatricial tissue, various dilators have been invented. In most cases the use of these instruments is facilitated by the previous performance of tracheotomy, which is almost certain to have become necessary.

"The screw dilator is an instrument which I have occasionally used for the last fourteen years. It consists of three blades, which, when united together, form a solid instrument easily introduced into the larynx. When it has passed into the constricted larynx, a screw at its proximal extremity enables the operator to open the blades and thus effect distention, the degree of which is shown on a dial placed over the screw."—"Pharynx, Larynx and Trachea." Mackenzie. 1880.

See "WHISTLER'S CUTTING DILATOR," Fig. 2495.

LARYNGO-TRACHEAL.

STENOSIS, DILATORS, CATHETERS.

FIG. 2514.—Navratil's Laryngeal Dilator.

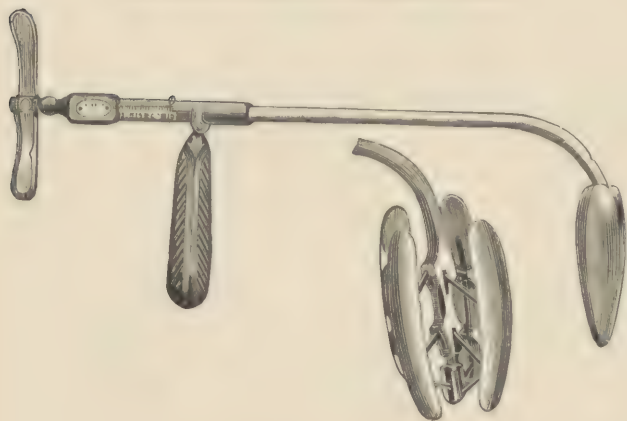
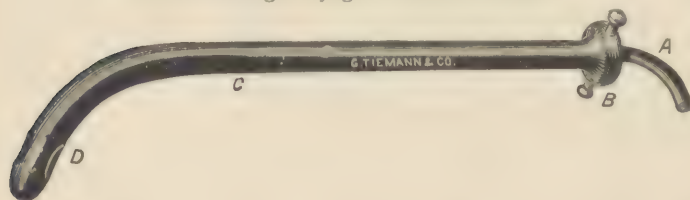


FIG. 2515.—Schrötter's Hard Rubber Laryngeal Catheter, for Treating Laryngo-Tracheal Stenosis.



canula. While the catheter is in position it will conduct the profuse flow of saliva and mucus, which may best be caught by a moderately large sponge, previously squeezed dry.

"Professor Navratil, of Pesth, has invented an instrument very much on the principle of my dilator, but much more perfect in its details, and consisting of four segments instead of three. Moreover, the dilating action in his instrument is confined to its laryngeal portion, while in mine it extends a little above its angle. The only objection to Professor Navratil's instrument is its extremely complicated construction, which renders it liable to get out of order and difficult to clean."—"Pharynx, Larynx and Trachea." Mackenzie. 1880.

A, extra cylinder; *B*, flange and metal pins, designed as position indicators, and also for securing a firm grasp of the instrument; *C*, commencement of triangular portion, which extends thence to the beak; *D*, beak of catheter, showing its four openings.

Catheterization for the cure of laryngo-tracheal stenosis is practiced either independently of or after tracheotomy has been performed, and the patient is able to breathe for a short time without the

ON LARYNGEAL STENOSIS.

"To prevent death from gradual suffocation, local treatment must be primarily and immediately undertaken, always with the object of overcoming the constriction in such a manner as to allow the lungs to receive again the normal amount of oxygenated air which has for a time been cut off from them. It has long been the custom in this emergency to obviate this trouble by the creation of a second one (tracheotomy), which is but little better than the first, and by which—although air is certainly allowed to pass to the lungs—the original trouble is in no wise benefitted nor its progress stopped.

"In some cases of imminent death this treatment is not only justifiable, but is most judicious. Before being undertaken, however, a most careful laryngoscopic examination should be made; for sometimes, when the permanent constriction is not very great, the breathing may be temporarily obstructed, either by a slight oedema glottidis or a collection of mucus in the larynx, in which case the trouble can be treated through the natural passage, either by scarification of the oedematous membrane with the laryngeal lancet (see "Whistler's Cutting Laryngeal Dilator, Fig. 2495), or by tubage of the glottis, without any necessity for an external opening being made in the throat.

"Catheterization or tubage of the larynx was advocated by Dessault as far back as 1793, and afterwards by Bouchut, Trousseau, Weinlechner and Horace Green, for some cases of urgent dyspnoea; but in all these instances it was only intended to give temporary relief. To Schrötter is due the credit of introducing the use of tubes for the systematic dilatation and permanent cure of laryngeal strictures (see Fig. 2515).

"These tubes are of gradually increasing diameters, and are about ten inches long, have perforations at the end, and are hollow throughout their calibre. They have a long curve of about one-third their length, for introduction into the larynx; and at the oral end of the instrument a curved cylinder about two inches long is inserted, to prevent its slipping and to protect the face of the operator from mucus, &c. The introduction of the tubes is effected in this way: Having slightly warmed and well oiled one, it is passed behind the epiglottis and placed over the orifice of the glottis; then, by keeping up constant and steady pressure it will, if it be of proper size, presently glide through the opening into the trachea, and the breathing through it will be instantly apparent by the tubular sound, and may be felt by

LARYNGO-TRACHEAL.

ON LARYNGEAL STENOSIS. (Continued.)

placing the hand over the end of the tube. The length of time the patient will allow the tube to remain in the larynx varies. At first it can only be retained a few seconds, but after each introduction it is better tolerated, and sometimes may be worn for one or two hours or longer.

'Of the cases treated by me, some retained the tube about fifteen minutes without much discomfort; others never allowed it to remain longer than three or four minutes; so I introduced it several times at each sitting, which proved sufficient to break the adhesions and dilate the glottis to quite a sufficient extent for easy respiration. The sensation or irritability of the larynx is usually very much diminished in chronic laryngitis.'

TRACHEOTOMY TUBES AND DILATORS.

FIG. 2516.—McSherry's Tracheotomy Tubes.

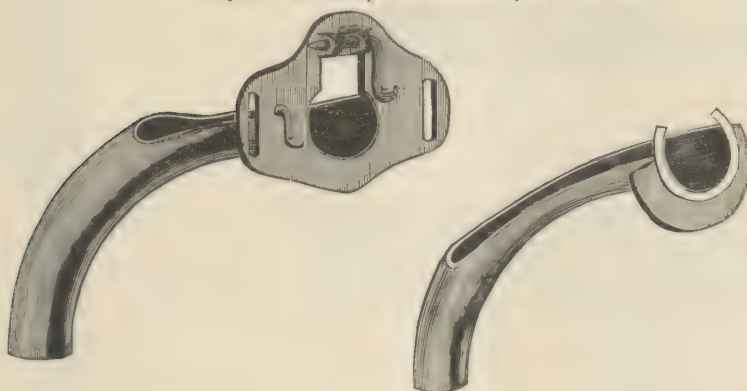


FIG. 2517.—McSherry's Laryngeal Dilator.

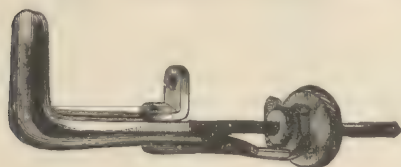
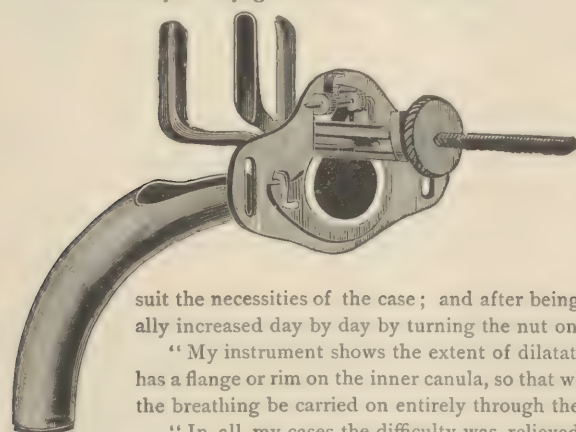


FIG. 2518.
McSherry's Laryngeal Dilator in Position.



"The method that Schrötter makes use of for those cases in which tracheotomy had been performed either through necessity or otherwise, and where the tracheal canula had become a *vade mecum* that they were doomed to bear silently to the grave, was like the tubage foreshadowed and suggested by the experiments that preceded it. The most remarkable cases in ante-laryngoscopic times are those of Mr. Liston. One was a laryngeal stenosis, treated and cured by him, in 1827.

by passing bougies of increasing

sizes into the larynx through a tracheal fistula that had been made in an attempt at suicide. The other, a tracheal constriction, is still more noticeable. Here he passed bougies of different sizes through an opening in the trachea, up through the larynx and out of the mouth; when one was passed he grasped it there, and then pushed the other end down into the trachea, and finally allowed one the size of an oesophageal bougie to remain fifteen days in the trachea—and this case was also cured.

"After the invention of the laryngoscope we have records of this trouble being treated by Czermak, Busch, Semeleder, Trendelenburg, Gerhardt, and later by a number of others. In most of these cases dilators were passed through a tracheal opening and upwards into the larynx; in none of them, however, was the method employed considered satisfactory; but I believe that an instrument invented by Stoerk, in 1874, for dilatation from below, altered so as to have three dilating blades instead of two, which would open antero-posteriorly as well as laterally, will be found most useful, and is one which, as modified by myself, I shall in future employ where tracheotomy has been performed. The dilators can have blades of different lengths to

suit the necessities of the case; and after being introduced into the stricture the dilatation can be gradually increased day by day by turning the nut on the screw outside of the plate of the canula.

"My instrument shows the extent of dilatation by markings in millimetres on the screw; and it also has a flange or rim on the inner canula, so that when the dilator is in position the canula can be corked and the breathing be carried on entirely through the larynx, which assists very materially the dilatation.

"In all my cases the difficulty was relieved by the treatment, and one patient who was for months absolutely dependent on a tracheal opening for respiration, after wearing the tracheotomy tube for one year, was then able to breathe with perfect comfort entirely through the natural passage."—H. Clinton McSherry, M.D., Baltimore, Md.

LARYNGO-TRACHEAL.

INTUBATION OF THE LARYNX.

Dr. Joseph O'Dwyer's Method in Croup and Kindred Diseases.

FIG. 2519.—O'Dwyer's Mouth Gag.



FIG. 2520.—O'Dwyer's Larynx Tube and Introducer.

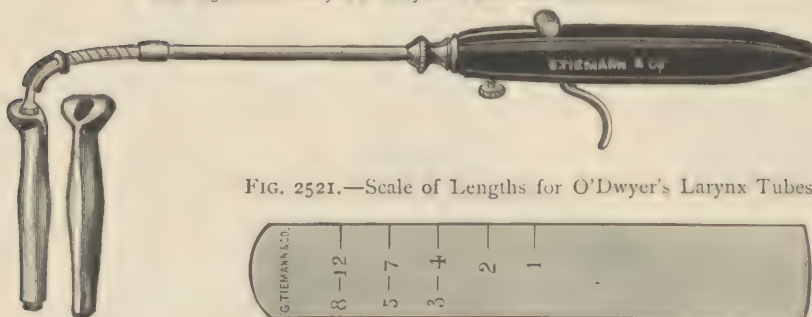


FIG. 2521.—Scale of Lengths for O'Dwyer's Larynx Tubes.

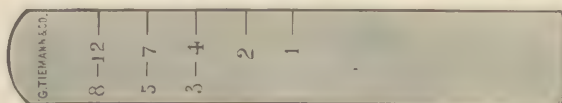
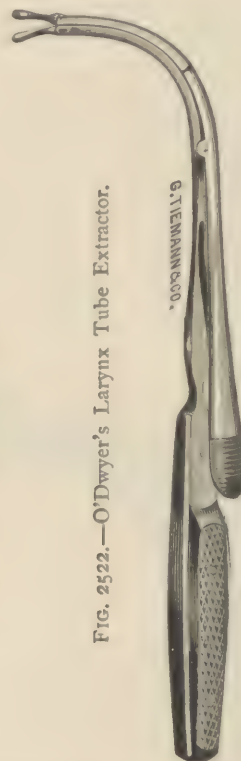


FIG. 2522.—O'Dwyer's Larynx Tube Extractor.



The Complete Set of O'Dwyer's Instruments for Tubing the Larynx.

- | | |
|-----------------|-------------------------------|
| 1 Mouth Gag. | 1 Extractor. |
| 1 Introducer. | 1 Scale. |
| 6 Larynx Tubes. | 1 Morocco, Velvet-lined Case. |

"The numbers on the scale (Fig. 2521) indicate the years for which the corresponding tubes are suitable. For instance, the smallest tube when applied to the scale will reach to the first line, marked 1, and is intended to be used up to the age of twelve or fifteen months; the size marked 2 is suitable for the next year; 3 and 4 for these years, and so on.

"When the proper tube is selected for the case to be operated on, a fine thread is passed through the small hole near its anterior angle, and left long enough to hang out of the mouth—its object being to remove the tube should it be found to have passed into the oesophagus instead of the larynx. The obturator is then screwed tightly to the introducer, to prevent the possibility of its rotating while being inserted and passed into the tube.

"The following is the *method of introducing the tube*, which is done without the use of an anæsthetic: The child is held upright in the arms of a nurse, and the gag (Fig. 2519) inserted in the left angle of the mouth, well back between the teeth, and opened widely; an assistant holds the head, thrown somewhat backward, while the operator inserts the index finger of the left hand to elevate the epiglottis and direct the tube into the larynx. The handle of the introducer (Fig. 2520) is held close to the patient's chest in the beginning of the operation, and rapidly elevated as the canula approaches the glottis. The tube is then pushed downwards, without using much force. It is then detached. The joint in the shank of obturator is for the purpose of facilitating this part of the operation. As soon as the obturator is removed, and it is ascertained that the tube is in the larynx, the thread is withdrawn, but at the same time the finger is kept in contact with the tube to prevent its being also withdrawn.

"It is important that the attempt at introduction be made quickly, as respiration is practically suspended from the time that the finger enters the larynx until the obturator is removed. It is therefore, under the circumstances, much safer to make several abortive attempts than one prolonged effort, even if successful.

"For the purpose of removal the patient is held in a similar position, except that the head is not inclined backward, or very slightly so, and the extractor passed into the tube guided by the index finger of the left hand, which also fixes the epiglottis, and is brought in contact with the head of the canula. Firm pressure with the thumb is then made on the lever above the handle while the tube is being withdrawn. If secondary dyspnoea supervenes at any time the tube should be removed and a larger one substituted. To avoid accidents it is very essential to have some preliminary practice on the cadaver, particularly in extracting, which is the more difficult operation, owing to the aperture of the tube being so much smaller than that of the larynx. These tubes will also prove valuable as dilators in chronic stenosis of the larynx or trachea.

LARYNGO-TRACHEAL.

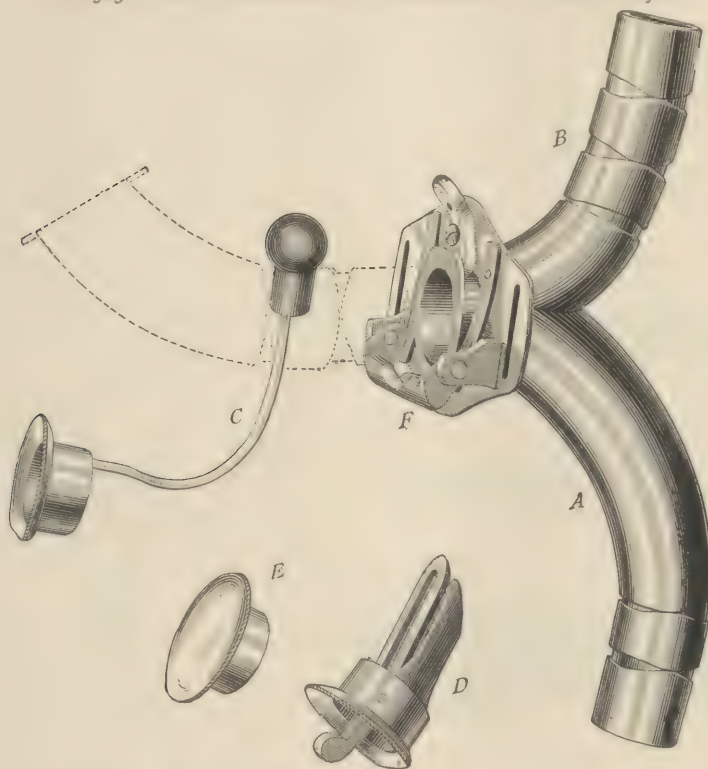
TOTAL EXTIRPATION OF THE LARYNX AND AN ARTIFICIAL SUBSTITUTE.

(Extract of an account of the operation as performed Dr. ROSWELL PARK, Professor of Surgery, Medical Department, University of Buffalo, &c., on June 25, 1885.)

" * * * Patient anesthetized. * * *

"It was necessary to make a long incision in the middle line, which ran from a little in front of the body of the hyoid to one inch below the upper end of the sternum; this made it about six inches long. Careful dissection was then made down on either side of the larynx and trachea, the muscles attached to the sides of the larynx were peeled back with a sharp periosteum levator. This separation of soft parts on either side was carried as high as the hyoid bone and as low as the second or third rings of the trachea. Vessels were caught in hæmostatic forceps as fast as they bled, and tied later with catgut; a few larger veins were tied twice and cut between ligatures; about twenty-five hæmostatic forceps were employed, once or twice all being in use at one time. Up to this period patient had breathed his chloroformized air by the mouth. After the deep parts had been well exposed, and the lateral portions held aside with retractors, and after the operator's fingers had pretty completely separated the trachea from the œsophagus, the thyroid cartilage was opened for exploratory purposes. This was no easy task, and sharp-cutting bone forceps were necessary before it could be accomplished, so firmly was it calcified. The trachea was divided, first, longitudinally through its upper three rings, and then transversely between the first and second ring. A Trendelenburg tampon tracheal canula was then inserted, and, as its rubber balloon proved faulty, sponge was packed around its main tube; the tube and funnel for the anæsthetic connected with it were utilized during a part of the remaining time. The larynx and upper tracheal ring were now rapidly separated from the œsophagus, and, after this separation was complete from below, the

FIG. 2523.—Park's Modification of Gussenbauer's Artificial Larynx.



thyro-hyoid membrane was divided, and then the remainder of the lateral walls of the lower pharynx; the constrictors were dissected off from their insertions into the larynx, and the whole removed in one piece. Hæmorrhage was checked, and then the parts explored for evidences of any extra-laryngeal suspicious tissue. None was found. The uvula, which had been for some time very sensitive, and in which a little firm nodule was felt, was excised. The upper part of the epiglottis, with its glossal and lateral connections, was left in position.

"After all the bleeding points had been attended to, the tracheal tube was removed, and a strong silk suture introduced on either side through the skin and the upper tracheal ring, which, it will be remembered, had been split vertically. These were the only sutures used, and were for the purpose, not of trying to pull the trachea up in the neck, but simply of holding it well to the front. A large single trachea tube of aluminium, made for the purpose, was then introduced and held by tapes around the neck. Over its upper surface fell the anterior-cut margin of the œsophagus. Iodoform was dusted sparingly throughout the wound and the

whole cavity carefully packed with iodoform gauze, so arranged that a pathway to the œsophagus was left, this latter being lightly plugged with the same material. This ended the operation, which lasted about one hour.

"Fourteen weeks after the operation, an opening barely admitting a finger tip, and which has had its present size for eight weeks, remains. Through this small opening are introduced the various portions of the most ingenious mechanism, known as "Gussenbauer's Artificial Larynx" (which has been modified by Dr. Parks to suit the case.—G. T. & Co.)

LARYNGO-TRACHEAL.

Total Extirpation of the Larynx and an Artificial Substitute. (Continued.)

"It consists of a tracheal tube of large size, *A*, with rings at its lower end permitting a slight motion, corresponding to the natural flexibility of the trachea. Through its front plate and through an opening on its upper curvature passes a second pharyngeal tube, *B*, made also flexible, with an opening on its lower curved surface, so placed that a stream of air may play freely through both tubes, even though the external outlet be closed. The upper end of the pharyngeal tube lodges behind and below the epiglottis, if this has been left *in situ*, or behind and below the base of the tongue, as the case may be. Around it the œsophagus granulates and closes, so that, after the healing process is complete, the only passage from the pharynx into the larynx is by way of the metal tube. In order that fluids and solids may not pass through this, an obturator, *C*, is provided, which is passed through the external opening and up through the tube, so that its rounded upper end plugs the upper end of the pharyngeal opening, thus preventing passage of anything into the trachea. But since this would also shut off air, the obturator is attached below, not to a solid plug, but to a ring, as seen, which fits accurately into the external opening of the instrument, through which, then, the patient breathes so long as this plug is worn, *i. e.* while taking his meals. After a time the patients wearing these instruments learn to swallow readily without the assistance of the obturator. Except at meals the simple stopper, *E*, is worn, so that, at all other times, the patient breathes through the nose and mouth.

"Now the feature of greatest interest about this apparatus is the vocal part. The vocal cords do nothing in articulate speech but furnish the *tone* or *sound*, articulation is carried on by the parts above the larynx. With only the simple stopper in place, by aid of which the air current is directed toward the mouth, the patient will speak in a loud or "stage" whisper, which is distinctly audible, and his articulation is perfect. Now we can understand how we get a distinct speaking voice, providing we can introduce some substitute for the vocal cords, something which, by vibrating in the air current, may produce a distinct *tone*. And in the simple mechanism, *D*—only a free metallic reed, like a melodeon reed, playing freely in a movable slotted bar, and fitted inside of a stopper like the other one—we have such a substitute. The movable bar carrying the reed has an external lever, by means of which the wearer is enabled, with a touch of his finger, to throw it in or out of the air current, and thus, as it were, to voluntarily open or close his glottis. Placing this part of the instrument *in situ*, and throwing the reed into the air current, the metal strip vibrates as it does in the jews-harp, and the sound thus produced is converted, by the articulating parts above, into something more than a whisper—into *distinct speech*. To be sure this voice is now monotone, but it is nevertheless a *voice*, and the wearer of this apparatus is capable of carrying on a conversation."

FIG. 2524.—Dr. Foulis' Modification of Gussenbauer's Artificial Vocal Apparatus.

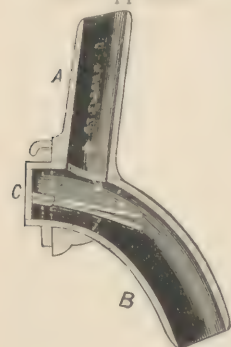


FIG. 2525.—Trousseau's Forceps, for Removing Clots of Blood or Mucus from the Canula while *in situ*.

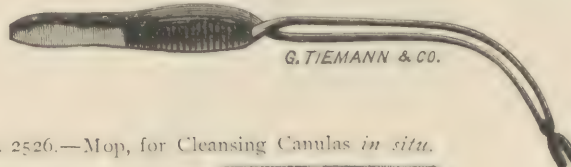


FIG. 2526.—Mop, for Cleansing Canulas *in situ*.

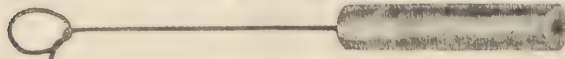


FIG. 2527.—Tiemann's Tracheal Aspirator.



For clearing the trachea of blood-clots or mucus, after the insertion of the trachea tube. It is simply a hard rubber syringe terminating into a soft rubber cup; this is easy of application over the inserted canula. If the thumb be placed on the air-hole of the barrel, the soft rubber cup applied, the piston drawn, mucus or clots of blood will enter the barrel. By taking the thumb off the air-hole the instrument detaches easily, may be cleansed and used again if necessary.

One of the simplest of these is made on the principle of a dry cup with a rubber ball (see Fig. 1653, page 115).

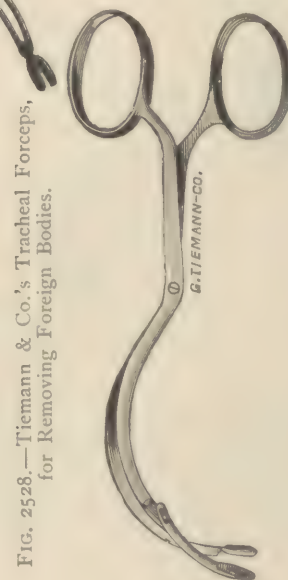


FIG. 2528.—Tiemann & Co.'s Tracheal Forceps, for Removing Foreign Bodies.

TRACHEOTOMY--BRONCHOTOMY.

Cutting an Opening into the Trachea or Larynx for the Extraction of Foreign Bodies, or to permit the Passage of Air to the Lungs.

FIG. 2529.—Finger Protector.



FIG. 2530.—Tiemann & Co.'s Tracheotome and Dilator.



FIG. 2533.—Buck's Tracheotomy Guide.



FIG. 2532.—Well's Retractor.



FIG. 2534.—Rose's Retractor.



FIG. 2531.—Tracheotomy Scalpel, Probe Point.



FIG. 2535.—Tracheotomy Scalpel, Sharp Point.



FIG. 2536.—Tardieu's Trachea Scissors.

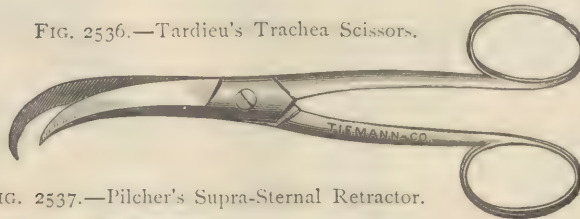


FIG. 2537.—Pilcher's Supra-Sternal Retractor.

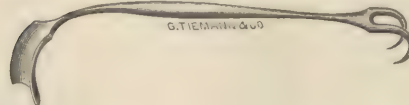


FIG. 2538.—Pitha's Tracheotome and Dilator.

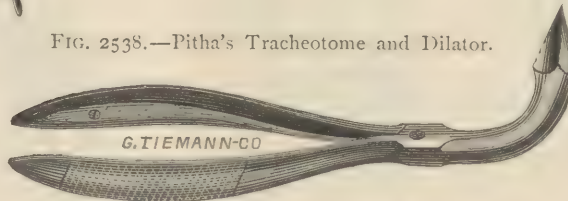


FIG. 2539.—Tracheotomy Blunt Hook.

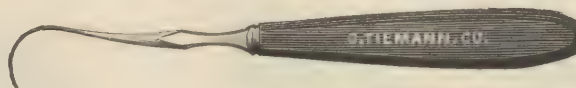


FIG. 2540.—Pilcher's Retractor.



FIG. 2541.—Langenbeck's Tracheotomy Double-Hook.



FIG. 2542.—Langenbeck's Tracheotome.



TRACHEOTOMY--BRONCHOTOMY.

Cutting an Opening into the Trachea or Larynx for the Extraction of Foreign Bodies, or to permit the Passage of Air to the Lungs.

FIG. 2543.—Pilcher's Bronchotome,
for Removing Pieces from the Trachea.



FIG. 2544.—Hank's Tracheotome.

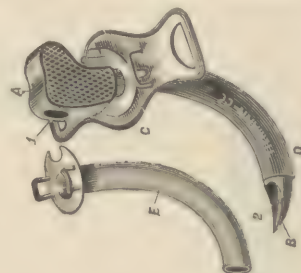


FIG. 2545.—Delaborde's Tracheal Dilator.

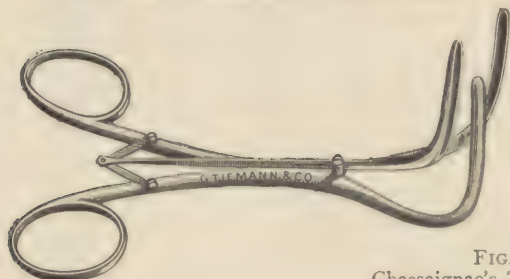


FIG. 2546.—Trousseau's Dilator, to Facilitate the
Introduction of Canulas.

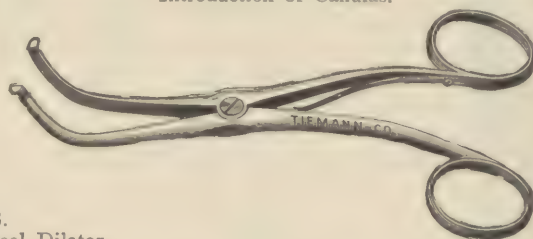


FIG. 2548.
Chassaignac's Tracheal Dilator.

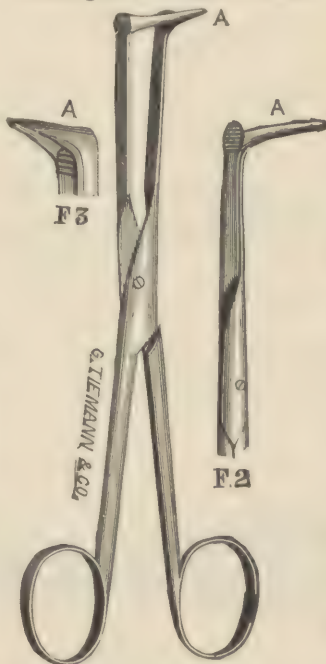


FIG. 2547.—Double Trachea Tube,
Silver Plain.

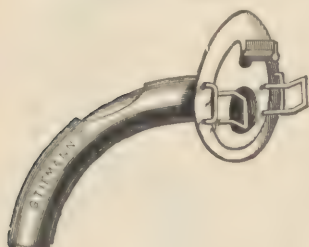


FIG. 2550.—Double Trachea Tube,
Movable Plate, Silver.

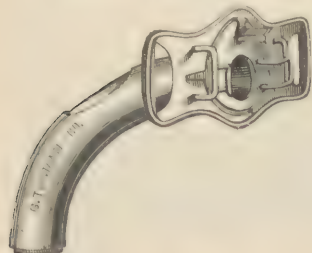


FIG. 2552.
Little's Aluminium Trachea Tube.



FIG. 2549.
Elsberg's Trachea Tube, with Valve.

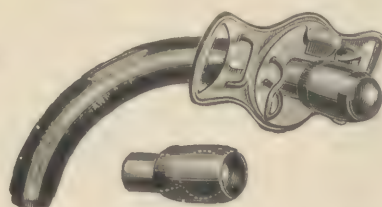


FIG. 2551.—Gendron's Split Canula, Silver.

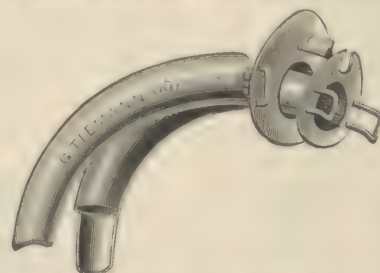


FIG. 2554.—Trachea Canula, Hard Rubber.

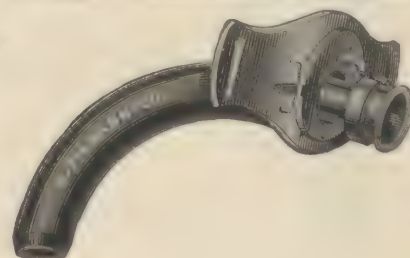


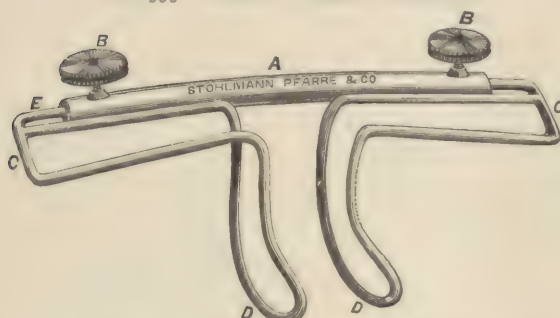
FIG. 2553.—Silver Trachea Canula.



TRACHEOTOMY--BRONCHOTOMY.

Cutting an Opening into the Trachea or Larynx for the Extraction of Foreign Bodies, or to permit the Passage of Air to the Lungs.

FIG. 2555.—Minor's Trachea Retractors.



A substitute for the tracheotomy tube, designed to hold open a wound in the trachea, so that the air can pass in and out of the windpipe through the same. *A* is a hollow rod, slightly curved, having a screw at each extremity, *B, B*, to set the retractors, *D, D*, which are then secured in the desired position by tapes adjusted at *C, C*.

FIG. 2557.—Gerster's Tracheal Tampon Canula.



A number of delicate steel springs are placed longitudinally around the lower end of a stout tracheal tube, so that, by turning a thumb-screw attached to the upper extremity of the oblique flange, they become diametrically dilated. A piece of rubber membrane, somewhat stouter than that used by Trendelenburg, is drawn over the steel springs, and on being equally dilated will insure perfect closure. A rubber tube is fitted into the distal opening of the canula, and bears at its end a funnel-shaped apparatus for the administration of the anæsthetic.—*Medical Record*, May 19, 1881.

FIG. 2559.—Trendelenburg's Trachea Tampon.



In using the apparatus please observe the following: 1. Before drawing a tampon over the canula moisten both parts with water. 2. Before inflation warm the tampon a little. 3. Do not inflate the tampon except within the trachea or within a tube of like dimensions, say a speculum or other glass cylinder. 4. The tampon should not be too old.

FIG. 2556.—Johnson's Double Canula and Obdurator. Modification of Durham's.

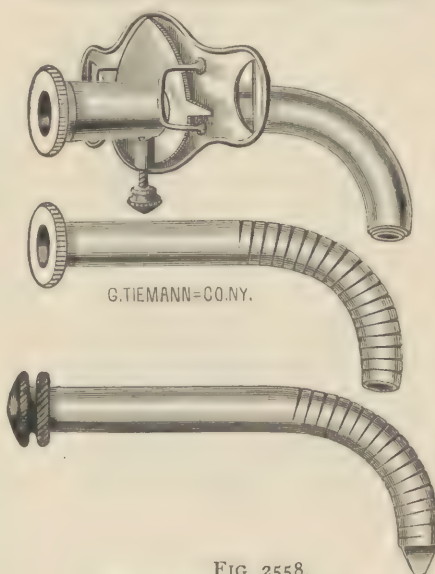
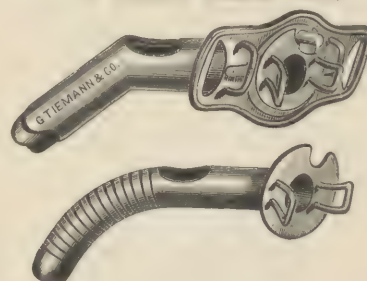


FIG. 2558.
W. W. Keene's Trachea Tube.



The trachea tube, *a* (Fig. 2559), is made of silver. A soft rubber sheath is drawn over the front part of it. A small canula, *b*, to which a rubber hose and bulb attaches, admits of blowing air between the rubber sheath and the silver tube, inflating the rubber so as to completely fill the trachea; a clamp prevents it from collapsing. The object of this is to keep the blood from entering the trachea or lungs whilst the surgeon is operating in the throat above the instrument, at the same time the lungs are supplied with fresh air through the larger opening of the silver tube. An anæsthetic may be administered by connecting the inhaling apparatus, *c*, with it.

RESPIRATORY -- INHALERS.

RESPIRATORY APPARATUS.

"In man the respiratory apparatus commences at the larynx, which communicates by the opening of the glottis with the pharynx. The larynx is continuous below with the trachea, a cylindrical tube, four inches in length and nearly one inch in width, running down the anterior part of the neck, on the median line, to the top of the chest. It is composed of a fibrous membrane, strengthened by a series of cartilaginous rings, complete in front, but open posteriorly, which serve to maintain the cylindrical form of the trachea and to keep its cavity open for the free passage of air. It is lined with a mucous membrane covered with ciliated epithelium. At the upper part of the chest the trachea divides into two main branches, of a structure similar to its own—the right and left bronchi; each of which passes to the root of its corresponding lung. Here the bronchi begin to divide, subdivide and ramify, radiating in smaller and more numerous divisions to every part of the lungs, and becoming constantly more delicate and membranous in their texture. They are now called the bronchial tubes; and their smaller ramifications lose together their cartilaginous element, and consist only of a fibro-elastic tubular membrane. Each terminal bronchial tube finally goes to a special division of the pulmonary tissue, termed a lobule. This is an air sac of more or less conical form, the bronchial tube opening into it at its apex, while its base is turned in the opposite direction. The interior of the lobule, like the entire lung of the frog, is imperfectly divided by membranous partitions into secondary cavities of a cup-like form, all of which, though separated from each other, communicate with the central cavity of the lobule. These terminal cavities, into which the air finally penetrates, are called the air vesicles. The air vesicles are rounded cavities, about $\frac{1}{16}$ of an inch in diameter, lined with a single layer of pavement epithelium. They are surrounded by a tissue containing a large proportion of elastic fibres, in which also ramify the capillary blood-vessels. Owing to the small size and excessive multiplication of these air vesicles, the entire extent of respiratory membrane in the human lung is very great. It has been estimated by Lieberkühn at not less than 1,400 square feet, and there is reason to believe that this estimate is not an exaggeration. The tissue of the lungs is thus of a spongy nature; that is, it contains a multitude of minute cavities, filled with air, disseminated through a soft, moist, fibrous and vascular texture. Accordingly, unlike any of the other internal organs, the lungs are lighter than water, and float upon its surface when separated from the body. They also retain the air entangled in their substance with such obstinacy that it cannot be expelled by any compression or violence short of absolutely disintegrating the pulmonary substance; and the lungs, if healthy, will still float upon the surface of water, even after they have been bruised and mutilated to an excessive degree. This has given rise to the "hydrostatic test" for determining whether a newly-born infant found dead has been born alive. The lung which has never breathed sinks in water like any other solid organ; but, if respiration has been once completely established, the lung floats, and cannot be made to sink by any ordinary method of manipulation. The application of this test, however, requires several precautions in particular cases, which are usually fully discussed in works on medical jurisprudence. The lungs are supplied with blood from two sources. First, the pulmonary artery brings the venous blood from the right ventricle of the heart and distributes it to the pulmonary capillaries, when it is returned to the left auricle by the pulmonary veins. This blood, which is in great quantity as compared with the amount of solid substance in the pulmonary tissue, is brought to the lungs, not for the nutrition of these organs, but for its own aëration. Secondly, the bronchial arteries, a number of small vessels which come off from the thoracic aorta, and follow the ramifications of the bronchi and bronchial tubes, supply these tissues with arterial blood for the purpose of their own nutrition. It is returned to the right side of the heart by the bronchial veins. The nerves of the lungs consist of the pulmonary branches of the pneumogastric nerve, and the pulmonary plexuses of the sympathetic. They are also provided with an abundant supply of lymphatic vessels; and the lymphatic glands belonging to them, known as the "bronchial glands," often become very conspicuous at the root of the lungs, from the deposit in adult life of a dark pigmentary matter in their substance. The lungs are liable to a variety of acute and chronic diseases, the most important of which are pneumonia, or inflammation of the lungs, and pulmonary phthisis, or wasting of the lungs owing to a tuberculous deposit in their substance. They are also liable to be compressed by serous effusions into the cavity of the pleura, to be wounded by the extremity of a fractured rib, or to be the seat of hæmoptysis or of pulmonary apoplexy."—"American Cyclopædia."

INHALATION.

Inhalatio Pulmonalis.—"The act of drawing air or vapor into the lungs."—DUNGLISON.

For Inhalation of Airs, Gases, Vapors, and Fumes.

"The utilization of the normal act of inspiration for conveying air impregnated with remedial agents to the diseased structures themselves, in the treatment of disorders of the lungs and air passages, has attracted the attention of physicians from the remotest period; inhalation is at least as advantageous a mode, in many instances, for the administration of appropriate remedies as the skin or connective tissue. The material inhaled comes directly in close juxtaposition to the blood while it is in its most vital state, and is thus more promptly and more thoroughly absorbed into the tide of the circulation than when it traverses part of the venous circuit before exposure to the inspiratory effort. It is often advantageous, too, that nothing shall interfere directly with the digestive functions."—"Inhalation: its Therapeutics and Practice." Cohen. 1876.

INHALERS.

Pneumatic Apparatus, for Inhalation of Condensed and Rarefied Air.

"In compressed and rarefied air we have powerful means of physically impressing the respiratory and circulatory systems, and thus of acting therapeutically upon them in diseases in which their functions are abnormally executed.

Inspiration of compressed air increases the pressure on the lungs, and thus augments the vital capacity; the chest becoming expanded to greater extent than can be accomplished by the most powerful voluntary inspiration of normal air. * * * *Expiration into compressed air* diminishes the quantity of expired air in proportion to the density of the compressed air."—"Inhalation in the Treatment of Disease: its Therapeutics and Practice." J. Solis Cohen, M.D.

FIG. 2560.—Fränckel's Pneumatic Apparatus.



By drawing the accordeon apart, the air contained in it will be rarefied; if it be compressed, the air will be condensed.

FIG. 2563. Hutchinson's Spirometer.

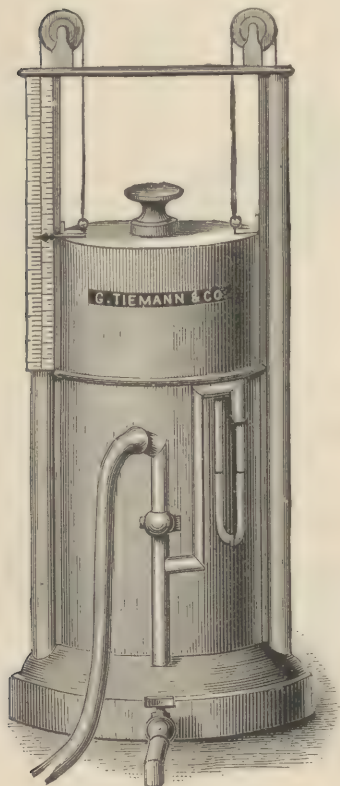


FIG. 2561.—Waldenburg's Pneumatic Apparatus.

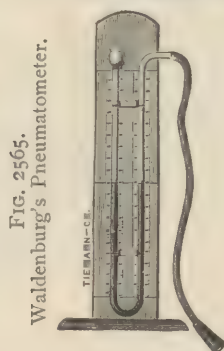
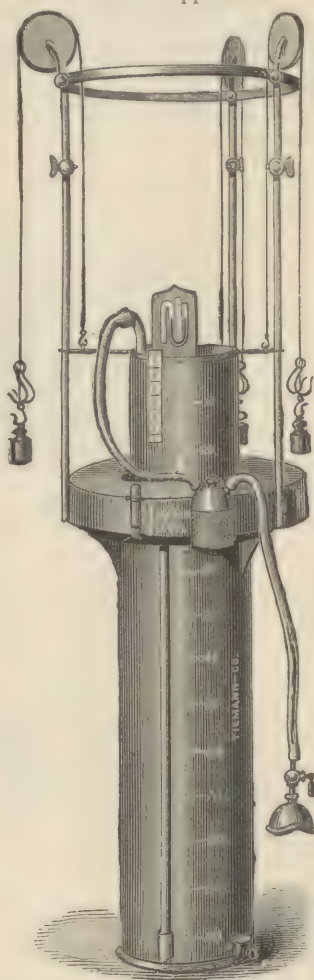


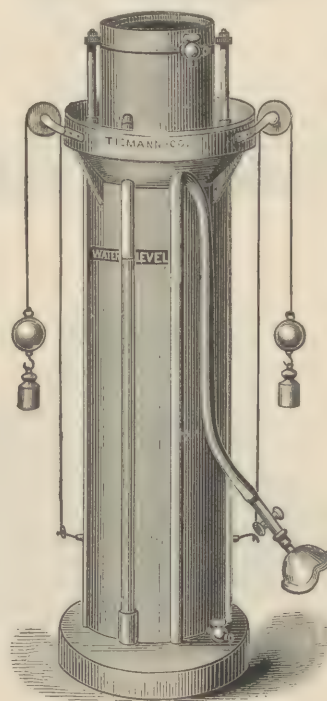
FIG. 2565. Waldenburg's Pneumatometer.

FIG. 2562.—Brown's Spirometer.



See "CHLOROFORM AND ETHER INHALERS," pp. 43 to 48.
"ROOSA'S," "HARDY'S," "BUT-
TLE'S" INHALERS," p. 201.

FIG. 2564. Tobold's Pneumatic Apparatus.



INHALERS.

Spirometers, for Measuring the Capacity of the Lungs.

Respirators, for Medicating and Tempering the Air before it reaches the Lungs in Inhalation.

FIG. 2566.—Richardson's Instrument to Reestablish Respiration in Asphyxia, by alternately working the Balls.

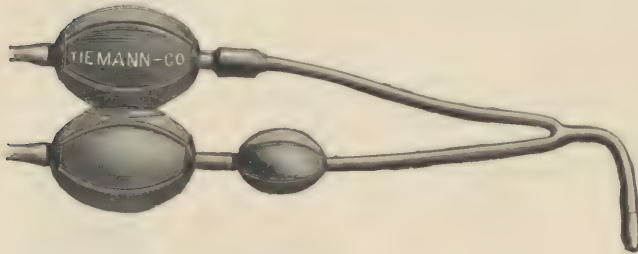


FIG. 2567.—Barnes' Spirometer.



FIG. 2568.—Jeffrey's Respirator, for the Mouth and Mouth and Nose.

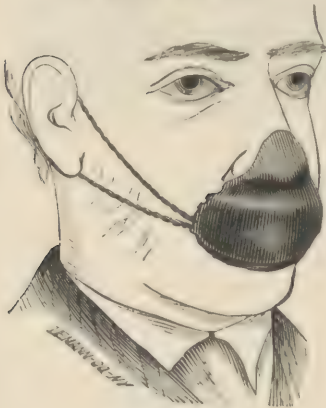


FIG. 2570.—Dobell's Residual Air Pump.



FIG. 2569.—Ramage's Inhaler.



FIG. 2571.
Tyndale's Antiseptic Oro-Nasal Respirator.

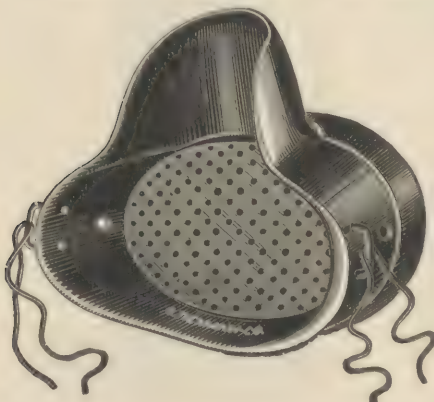
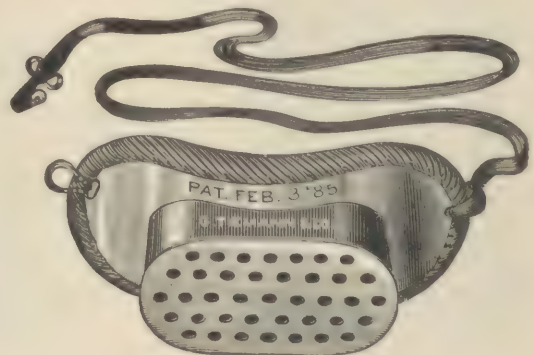


FIG. 2572.—Nitz's Respirator.



INHALERS.

For the Production of Steam of Hot Water, Vapors and Fumes of Ether, Chloroform, Iodine, &c., and for Inhalation in Affections of the Air Passages.

FIG. 2573.—Hot Air Bath.



FIG. 2575.—Nichols' Inhaler.

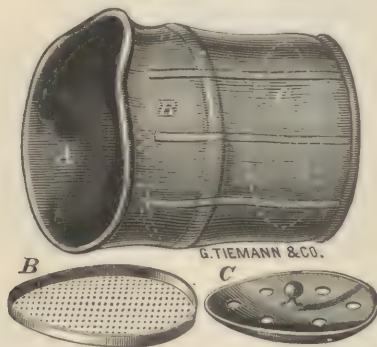


FIG. 2576.—Mackenzie's Eclectic Inhaler.



FIG. 2577.—Porter's Croup Kettle.

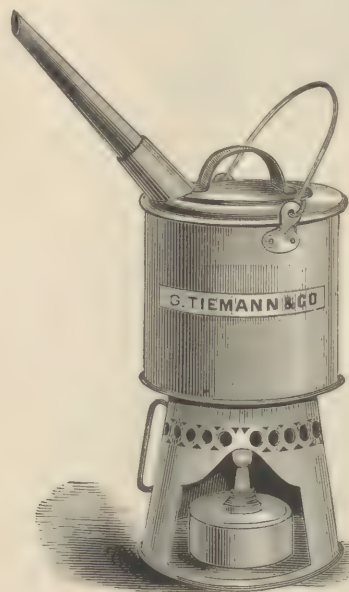


FIG. 2574.—Gedding's Respirator.



See
"CHLOROFORM AND ETHER INHALERS,"
pp. 43 to 48.
"BUMSTEAD'S," p. 122.
"ROOSA'S," "HARDY'S," "BUTTLE'S,"
p. 201.

FIG. 2578.—Roe's Inhaler.



The employment of hot moist air (steam), charged with a volatile matter, which latter should possess a decided and remedial action, is of the greatest value in the treatment of all acute and subacute inflammatory diseases of the larynx, and especially of those of the tonsils and pharynx. The inhalations can very properly be entrusted to the patient, and thus form an adjuvant to the local and direct treatment adopted by the surgeon.—"Pharmacopoeia for Diseases of the Throat and Nose." Lefferts. Putnam: New York and London. 1884.

INHALERS.

For the Production of Steam of Hot Water, Vapors and Fumes of Ether, Chloroform, Iodine, &c., and the Atomization or Nebulization of Medicated Fluids, for Inhalation in Affections of the Air Passages.

FIG. 2579.—Hunter's Inhaler.

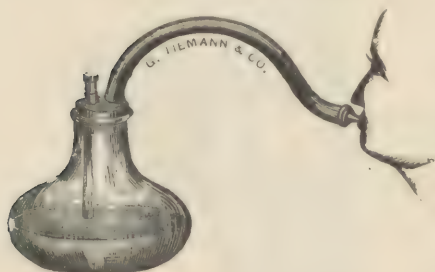


FIG. 2580.—Clinton's Atomizer.

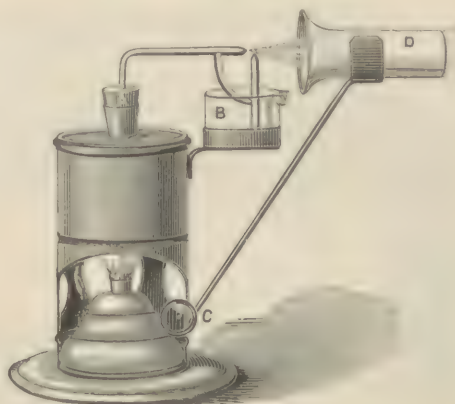


FIG. 2581.—Tiemann & Co.'s Steam Atomizer.



FIG. 2582.—Seeger's Steam Nebulizer.

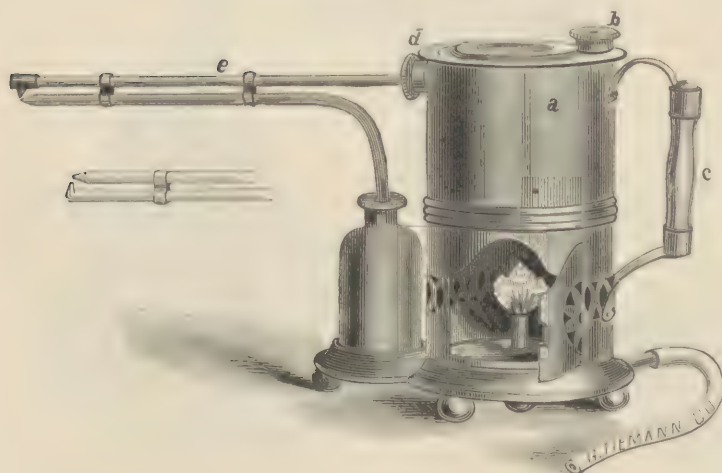
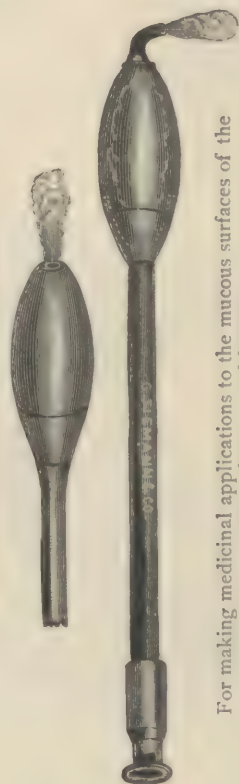


FIG. 2583.—Edson's Spray Producer.



For making medicinal applications to the mucous surfaces of the nares, pharynx and larynx.

INHALERS.

For the Atomization or Nebulization of Medicated Fluids, for Inhalation in Affections of the Air Passages and for Local Application.

FIG. 2584.—Sass' Spray Producer, with Receiver and Air Pump.

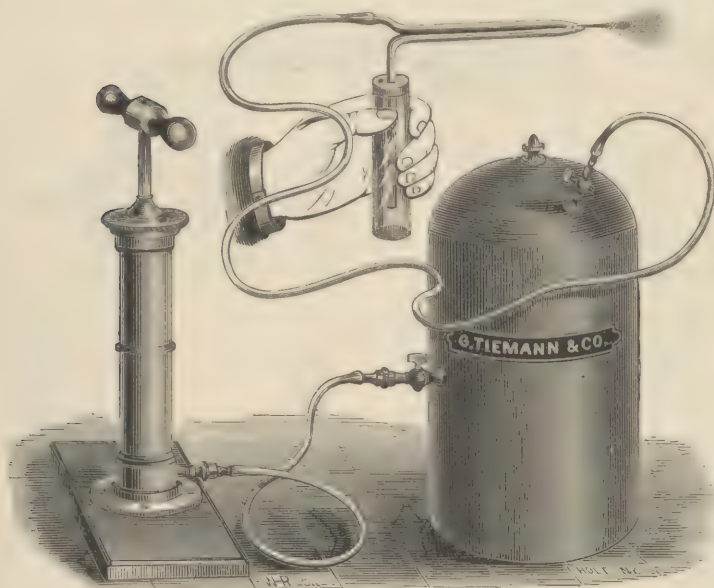
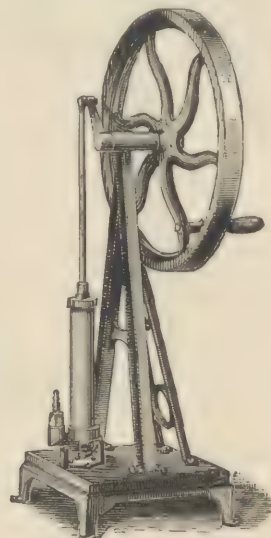
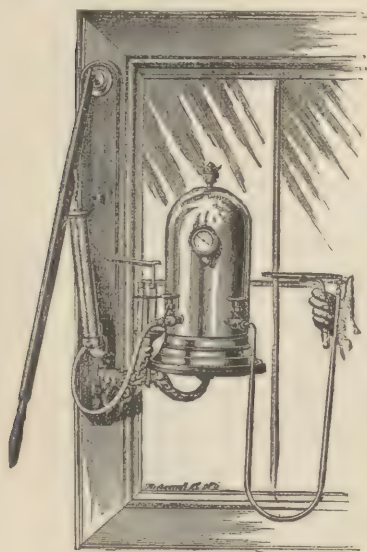


FIG. 2585.
Novelty Air Pump.



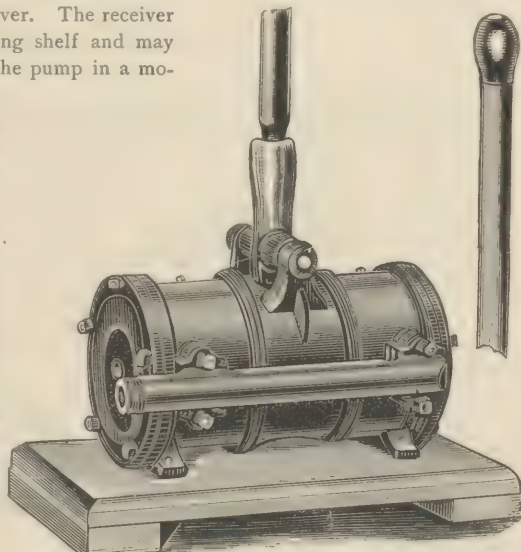
"The glass spray tubes of Sass, attached by means of india rubber tubing to a cylinder of compressed air, in which the amount of pressure is regulated by a guage at the top and the air let in or cut off at any moment by stop-cocks placed both on the cylinder near the tubing attachment and upon the tubing itself near the atomizing tubes—have been used by me with much satisfaction. The rubber tubing from the cylinder may be made to fit that on the glass atomizers by means of a bayonet joint. This arrangement makes their adaptation ready and secure. The cut off (Fig. 2425, 1) may be conveniently and securely attached to the air supplying tube and to any of the atomizing tubes in ordinary use."—"Nasal Catarrh." Robinson. 1880.

FIG. 2586.
Wile's Compressed Air Spray Apparatus.



The pump is attached to a bracket and worked by an ash lever. The receiver stands on a swinging shelf and may be detached from the pump in a moment. The spray tubes are modified after the pattern of Sass, but instead of being made of two glass tubes cemented together, they are made of one solid piece of hard rubber and the tops are screwed in and made interchangeable. By means of a small wrench they are readily unscrewed and taken out for purposes of cleansing.

FIG. 2587.—Burge's
Double-Acting Air Compressor.



INHALERS.

For the Atomization or Nebulization of Medicated Fluids, for Inhalation in Affections of the Air Passages and for Local Application.

FIG. 2588.—Sass' Spray Tube and Bottle.

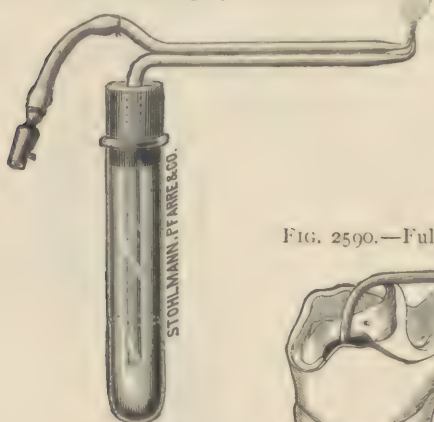


FIG. 2589.—Chapin's Laryngo-Tracheal Spray, for Solution of Trypsin in Croup.

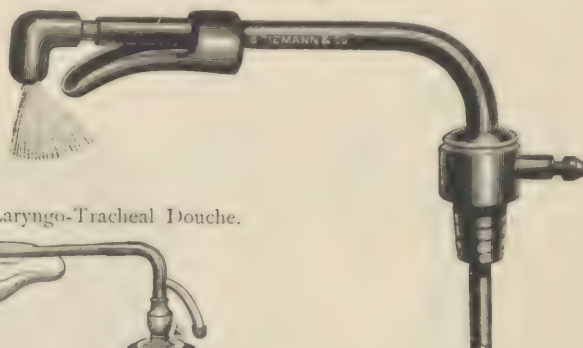


FIG. 2590.—Fullgraf's Laryngo-Tracheal Douche.

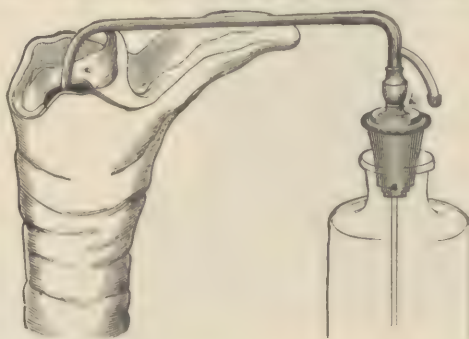


FIG. 2591.—Fluhrer's Spray Tube.

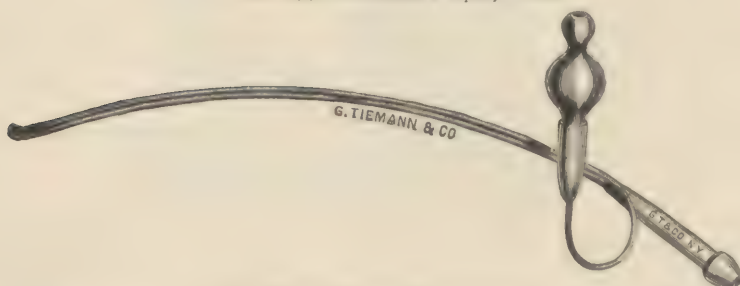


FIG. 2592.—Newman's Atomizer.

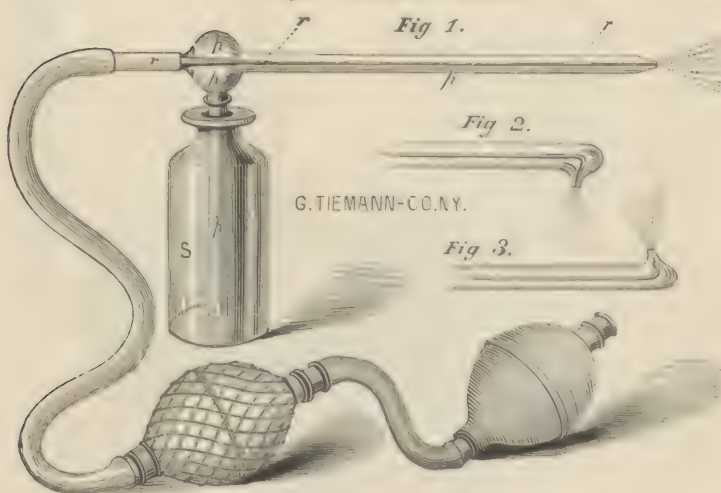
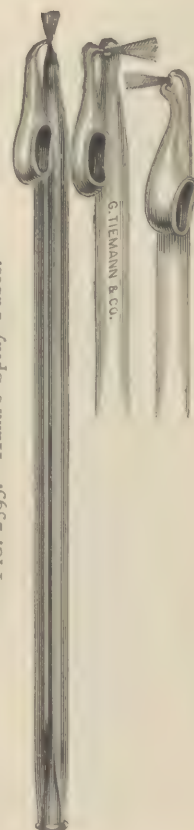


FIG. 2593.—Hank's Spray Tubes.



INHALERS.

For the Atomization or Nebulization of Medicated Fluids, for Inhalation in Affections of the Air Passages and for Local Application.

FIG. 2594.—Cleborne's Tongue Spatula and Atomizer, combined.

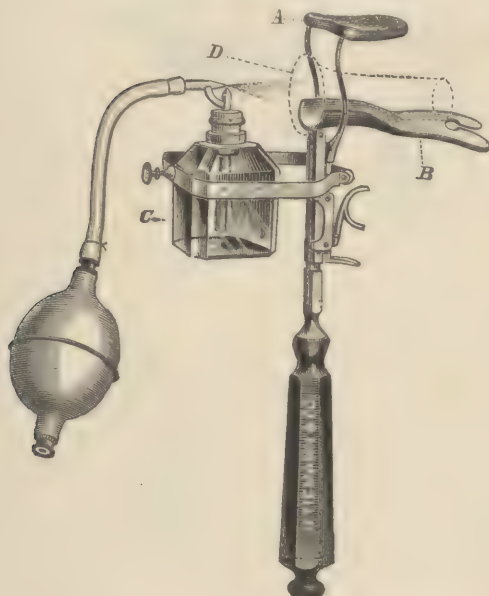


FIG. 2595.—Cleborne's Tongue Depressor, with Insufflator and Vaporizer, for all cavities of the body.

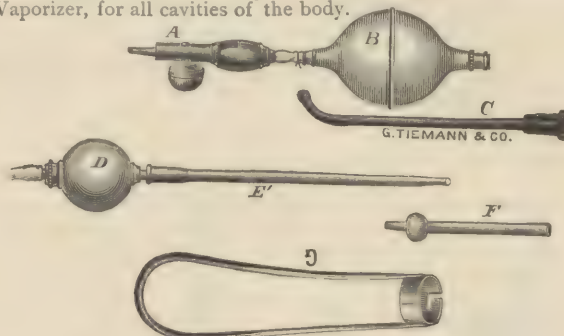


FIG. 2596.—Sass' Hand-Ball Spray Producer.

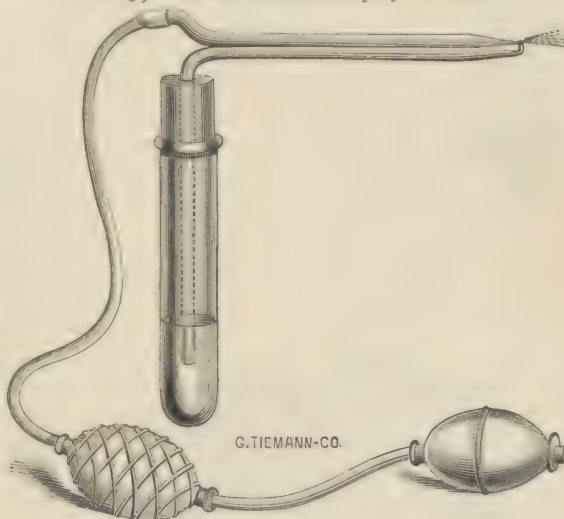


FIG. 2597.—Fullgraf's Flat-bill Laryngeal Spray.

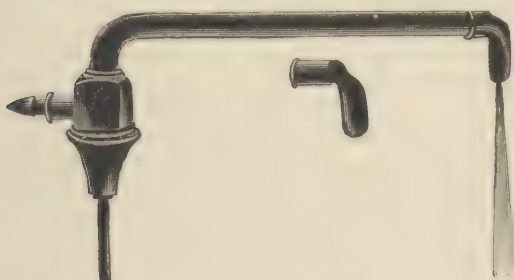


FIG. 2598.—Spray Tubes and Stand.

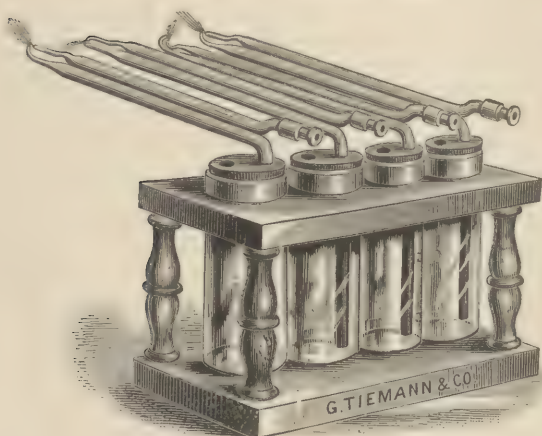


FIG. 2599.—Wight's Continuous Spray Apparatus.



INHALERS.

For the Atomization or Nebulization of Medicated Fluids, for Inhalation in Affections of the Air Passages and for Local Application.

FIG. 2600.—Burrall's Atomizer.

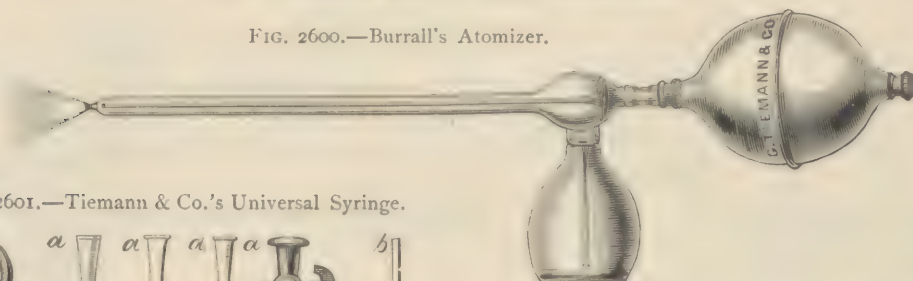


FIG. 2601.—Tiemann & Co.'s Universal Syringe.

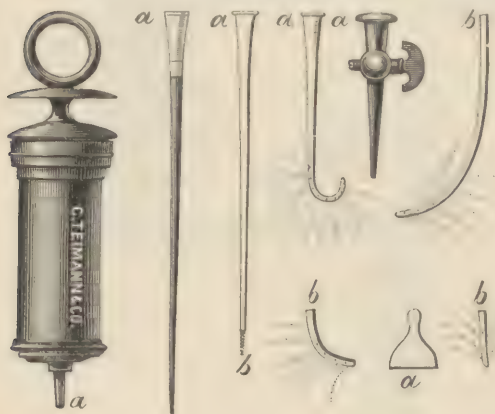
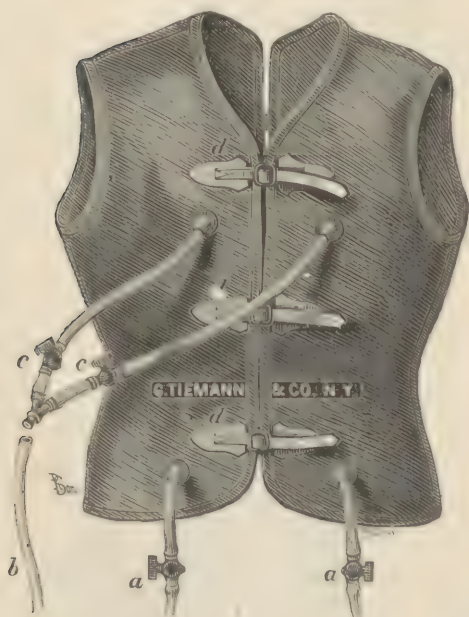


FIG. 2602.—Richardson's Spray Producer.



For Applying Heat to the Chest in the Treatment of Diseases of the Lungs.

FIG. 2603.—May's Steam Jacket.



With the object of bringing to greater perfection this important auxiliary (heat) in the treatment of diseases of the lungs, I designed a rubber apparatus, represented in the cut, manufactured by Messrs. Tiemann & Co.: *a*, stop-cock and exhaust tubes; *b*, three-quarter inch calibre steam tubing, which conducts the steam from a boiler through feeding tubes, *c*, *c*, to the jacket; *d*, *d*, *d*, buckles and straps. The boiler is cylindrical, composed of tin, eight inches in diameter, six inches high, holds two gallons of water (two-thirds of which quantity is necessary only for steaming purposes), and fits the top opening of a range, cooking stove, or portable kerosene stove. Its top converges into a three-quarter inch tube, to which the rubber tubing is attached.

The rubber steam jacket strictly fulfills all the essential requirements of a strong and powerful, yet moderate external stimulant, and possesses the following prominent advantages over poultices and other appliances: It envelopes the whole chest completely; it is light and readily applied; it retains its position on the chest without difficulty; it is easily managed and operated; it is capable of maintaining a constant and uniform temperature; it requires no renewal; and patients, if strong enough, can sit up in a chair, or, if too weak, lie in bed while using it.

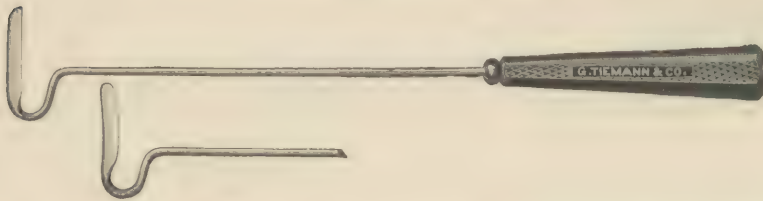
Before this jacket is applied it is necessary, in order to protect the skin from any undue effects of heat, to envelope the whole chest with a vest composed of spongiopilin, or of several

thicknesses of heavy flannel, which may be either wet or dry, according to the condition and indication of the patient. From a limited experience in the use of this steam jacket, I believe it to be a most valuable and important adjunct to the therapeutics of protracted and obstinate diseases of the lungs, such as interstitial pneumonia, chronic bronchitis, and even pulmonary consumption.—*New York Medical Journal*, October, 1879.

INJURIES AND DISEASES OF THE CHEST.

ABSCESSSES, EMPYEMA, HYDROTHORAX, HYDROPERICARDIUM.

FIG. 2604.--Westbrook's Curettes for Pleural Cavity.



See "PNEUMATIC ASPIRATORS," page 130; "DRAINAGE," page 75; "TROCARS FOR PARACENTESIS THORACIS" and "ROBERTS' PERICARDIAL TROCAR," page 126.

ALIMENTARY CANAL.

SURGICAL ANATOMY OF THE ALIMENTARY CANAL.

"The principal portions into which the canal is divided in the human subject are known as the *mouth*, the *œsophagus*, the *stomach*, the *small intestine*, and the *large intestine*. The mouth is the cavity included between the opening of the lips in front and the fauces behind. In it are the teeth, intended for the mastication and comminution of the food; the tongue, a muscular and sensitive organ, which subserves both the sense of taste and the proper movement and admixture of the food in mastication; and a lining membrane which contains mucous glandules destined to supply a viscid secretion forming part of the saliva. There are also the parotid, submaxillary, and sublingual glands, situated in the immediate vicinity of the mouth, which pour their secretions into its cavity, and thus complete the formation and supply of saliva, which is mingled with the food in mastication and reduces it to the condition of a soft pasty mass. Immediately behind the *fauces* is the *pharynx*, a short, funnel-shaped passage, leading directly to the *œsophagus*. The latter is a nearly straight tube of uniform size, about nine inches long and rather less than an inch in diameter. It passes through the neck and posterior region of the chest to the upper part of the abdomen, where it terminates in the *stomach*. It has a double layer of transverse and longitudinal muscular fibres, by whose peristaltic or wave-like contractions the masticated food is rapidly carried from above downward. Its lining membrane is of a simple structure, and produces only a small quantity of mucus, destined, by its lubricating qualities, to facilitate the passage of the food. The *œsophagus*, in fact, is simply an organ of transmission, by which the food is transferred from the mouth to the stomach, where the more important *digestive actions* are to begin. The *stomach* is a dilatation of the alimentary canal, lying transversely across the upper part of the abdomen. Toward the left side it expands into a wide hemispherical sac or pouch; towards the right side it becomes narrowed to a smaller diameter, where it unites with the upper extremity of the intestine. The orifice by which the stomach communicates with the *œsophagus* is called the *cardia* (Gr. *καρδία*, the heart), because it is situated near the heart; that by which it communicates with the intestine is called the *pylorus* (Gr. *πυλωρός*, a gatekeeper). Both are provided with a special circular bundle of muscular fibres, by which the food, once in the stomach, is retained there for a time, to allow of the secretion and operation of the gastric juice. The gastric juice is secreted by the mucous membrane of the stomach, which is soft, glandular, and vascular in texture, and, when stimulated by the contact of the food, pours out the gastric juice in considerable abundance, as the perspiration is exuded by the skin. Next the stomach follows the small intestine. This is a tubular canal, of about twenty-five feet in length and between one and two inches in diameter. It is thrown into numberless folds and convolutions, by which, notwithstanding its great length, it occupies a comparatively moderate space in the abdomen. It is attached to the abdominal portion of the spinal column by a thin flexible membranous sheet, termed the *mesentery*, which, while retaining it in its proper position, allows of the necessary movement of its different convolutions upon each other. Its muscular layers are well developed and active, and by their contractions continually urge the semi-fluid ingredients of the food through the tortuous windings of its internal cavity. Its mucous membrane is provided, first, with a great number of glandular follicles which secrete the intestinal juice, one of the active agents in digestion; and secondly, with minute filamentous vascular prominences or *villi*, which are so abundant and thickly set as to give its internal surface a velvety texture, and which, by their absorbent action, take up from the intestine the nutritious elements of the digested food. Into the upper part of the small intestine, a few inches below the stomach, there are also discharged two accessory secretions, namely, the *bile* from the liver and the *pancreatic juice* from the pancreas. The small intestine terminates in the lower part of the abdomen on the right side, by a junction at right angles with the *large intestine*, so called from its greater capacity as indicated by a transverse measurement, is about five feet long and from one and a half to two and

ALIMENTARY CANAL.

SURGICAL ANATOMY OF THE ALIMENTARY CANAL. (Continued.)

a half inches in diameter. It extends from its commencement in the right iliac region upwards on the right side of the abdomen, then transversely across to the left side, then downward upon the left side, then through an S-like convolution to the top of the pelvis, and finally through the cavity of the pelvis to the *anus*. At the point of junction of the small with the large intestine there are two parallel folds of mucous membrane, with their edges turned toward the cavity of the large intestine, which act as a double valve (called the *ileo-cæcal valve*), allowing the passage of material in this direction, but preventing their regurgitation from the large into the small intestine. The mucous membrane of the large intestine has no villi, but is provided with simple glandular follicles, which secrete various excrementitious materials. This portion of the alimentary canal contains, also, the refuse portions of the food, which, together with the excrementitious matters supplied by its lining membrane, assume a fæcal consistency and appearance from the situation of the ileo-cæcal valve downward, and are finally discharged from the lower extremity of the large intestine."*—"American Cyclopædia."

ŒSOPHAGEAL.

SURGICAL ANATOMY OF THE ŒSOPHAGUS.

"The relations of the œsophagus are of considerable practical interest to the surgeon, as he is frequently required in cases of stricture of this tube to dilate the canal by a bougie, when it becomes of importance that the direction of the œsophagus and its relations to the surrounding parts should be remembered. In cases of malignant disease of the œsophagus, where its tissues have become softened from infiltration of the morbid deposit, the greatest care is requisite in directing the bougie through the strictured part, as a false passage may easily be made and the instrument may pass into the mediastinum or into one or the other pleural cavity, or even into the pericardium.

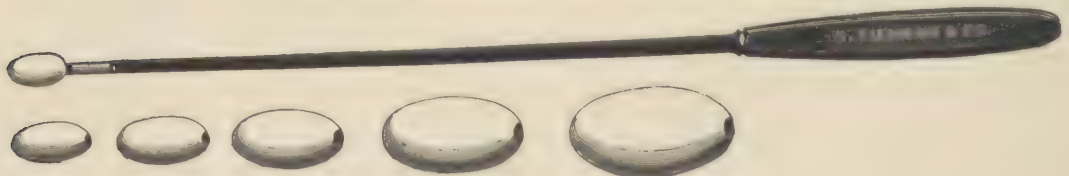
"The student should also remember that contraction of the œsophagus, and consequent symptoms of stricture, are occasionally produced by an aneurism of some part of the aorta pressing upon this tube. In such a case, the passage of a bougie could only hasten the fatal issue.

"It occasionally happens that a foreign body becomes impacted in the œsophagus, which can neither be brought upwards nor moved downwards. When all ordinary means for its removal have failed, excision is the only resource. This, of course, can only be performed when it is not very low down. If the foreign body is allowed to remain, extensive inflammation and ulceration of the œsophagus may ensue. In one case with which I am acquainted, the foreign body ultimately penetrated the intervertebral substance, and destroyed life by inflammation of the membranes and substance of the cord.

"The operation of œsophagotomy is thus performed: The patient being placed upon his back, with his head and shoulders slightly elevated, an incision about four inches in length should be made on the left side of the trachea, from the thyroid cartilage downwards, dividing the skin and platysma. The edges of the wound being separated, the omo-hyoid muscle and the fibres of the sterno-hyoid and sterno-thyroid muscles must be drawn inwards; the sheath of the carotid vessels being exposed, should be drawn outwards and retained in that position by retractors; the œsophagus will then be exposed, and should be divided over the foreign body, which should then be removed. Great care is necessary to avoid wounding the thyroid vessels, the thyroid gland and the laryngeal nerves."—"Gray's Anatomy."

STENOSIS.

FIG. 2605.—Dilators for Œsophageal Stricture.



(Hard rubber handle and bulb, whalebone stems.)

* "The *large intestine* is usually divided into three portions, the *cæcum*, *colon* and *rectum*."—Dunglison.

ŒSOPHAGEAL.

STRICTURE.

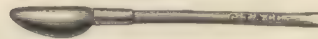
FIG. 2606.—Œsophageal Dilator. (Hard rubber handle and bulb, whalebone stem.)



FIG. 2607.—Roe's Œsophageal Dilators, on whalebone stems.



FIG. 2608.—Roe's Œsophagotome.



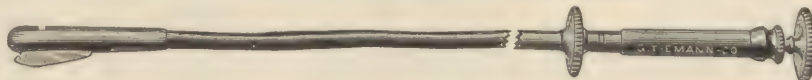
Roe's Œsophageal Dilators can be held in the stricture for a time at each introduction, giving the benefit of pressure, an advantage well known in overcoming stricture.—*Medical Record*, Nov. 11, 1882.

FIG. 2609.—Craweour's Œsophageal Dilator.



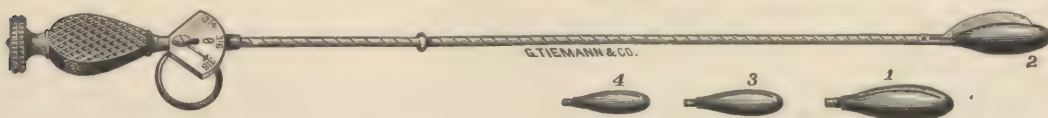
"They are fifteen inches long, and have a broad, flat handle. They terminate in an acorn-shaped bulb, and are made of four sizes: Nos. 15 to 17, 17 to 19, 19 to 21, and 21 to 24; and are perfectly flexible."—*Medical Record*, August 6, 1880.

FIG. 2610.—Mackenzie's Internal Œsophagotome.



"The shaft is fifteen inches long, made of gum elastic, and flexible. Through the centre runs a stem which is attached to the blade. When the instrument is introduced the blade is concealed in the metallic shield, which is firmly attached to the lower end of the shaft. The distance to which the blade may be thrown out is regulated by a screw in the handle."—*Medical Record*, Nov. 11, 1882.

FIG. 2611.—Sands' Œsophagotome.



" * * * The shank of the instrument, which is fifteen and a half inches in length and four millimetres in diameter, is a flexible tube made of narrow, spiral steel plate, secured within by two pieces of fine wire in order to prevent separation of the spiral coil. The instrument is provided with a variable number of steel bulbs, each bulb being furnished with a corresponding knife-blade. The bulb is firmly fastened by a screw to the distal end of the shank, and the knife is attached to an inner flexible steel rod, manipulated by a thumb-screw at the proximate end of the instrument. By turning this screw, the knife is drawn out from its concealed position within the bulb, the back of the blade sliding over a firm inclined plane. An index on a dial-plate indicates the amount of projection of the blade, the maximum projection being two and a half millimetres. A sliding ring on the spiral tube is used to indicate the distance of a stricture from the incisor teeth. I selected the metallic spiral tube for the shank of the instrument because it combines flexibility with strength. The bulb being conical, the operator can readily perceive when it comes in contact with the stricture before he projects the blade. In operating, a bulb must be employed which exactly fits the stricture; the depth of the incision will then just equal the distance to which the blade is projected by the action of the screw in the handle."—"Internal Œsophagotomy in the Treatment of Cicatricial Stricture." By Henry B. Sands, M. D. *Medical Record*, Feb. 9, 1884.

ŒSOPHAGEAL.

For the Removal of Foreign Bodies.

See also page 270, "THROAT FORCEPS," for Pharynx, Larynx, Trachea, and Gullet.

FIG. 2612.—Probang, with Silver Bucket, in three parts.

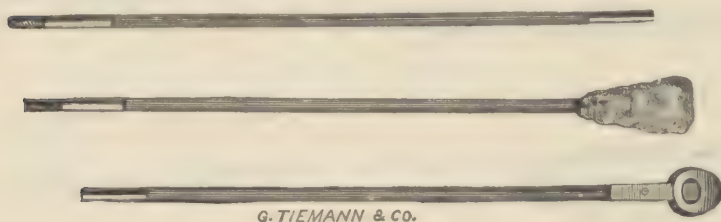


FIG. 2613.—Bristle Probang, for Removing Foreign Bodies.

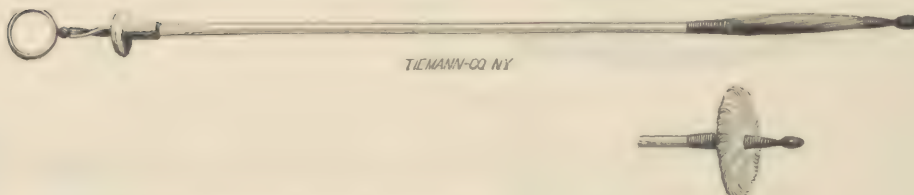


FIG. 2614.—Stanford's Bristle Probang.



FIG. 2615.—Schaffier's Throat (and Uterine) Scoop.

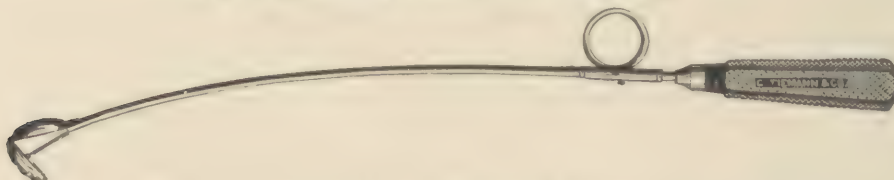


FIG. 2616.—Tiemann & Co.'s Œsophageal Forceps.

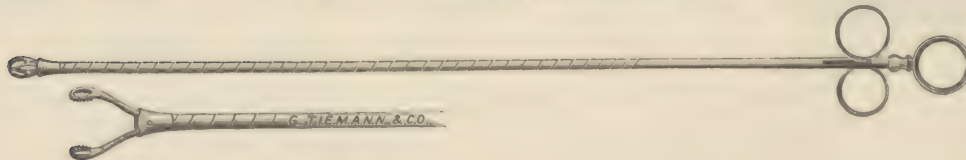
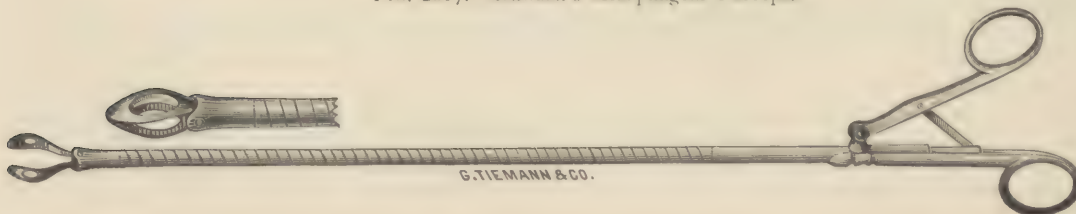


FIG. 2617.—Dawson's Œsophageal Forceps.

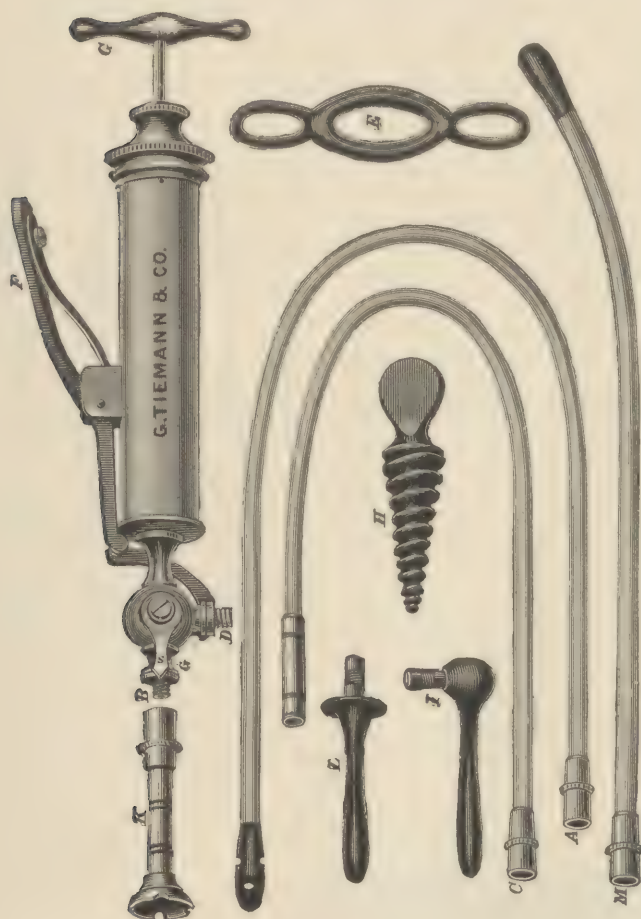


See also page 200, "LARYNGEAL FORCEPS."

STOMACHAL.

For the Artificial Introduction of Food into the Stomach when Deglutition is Impracticable;
for the Evacuation of its Contents in case of Poisoning, &c., and for Lavage.

FIG. 2618.—Lever Stomach Pump.



Lavage of the Stomach.

Washing out the stomach, and the aspiration of liquids secreted by it, is more and more practiced in Germany since Kussmaul highly praised this method. Dr. Schliep uses it in nearly all affections of the stomach, especially in chronic gastritis, with or without dilatation. The cure of chronic catarrh, according to his account in the *Deutsche Klinik*, Vol. XIV., would require a limited number of applications; in simple catarrh five would suffice on an average. He uses this method even in dyspepsia of consumptive patients. In dilatation of the stomach he empties that organ with the pump every day. He performs the washing out, even in cancer, with pure water; or adds bicarbonate of soda to the water if the liquids be very acid; or permanganate of potash if these liquids show signs of fermentation; carbolic acid when they contain vegetable parasites; boracic acid as a disinfectant, and tincture of myrrh in atonic dyspepsia with abundant secretion of mucus.—*Medical and Surgical Reporter*, May 15, 1875.

Directions for Using the Stomach Pump.

Attach the stomach tube, *A*, firmly on to the lower tap, *B*, of the pump, and affix the hose, *C*, on to the side tap, *D*. Place the mouth-gag, *E*, between the jaws of the patient, and introduce the stomach tube through the aperture. This mouth-gag serves the two-fold purpose of keeping the mouth open and of protecting the stomach tube against possible injury from the patient's teeth. After pressing the lever, *F*, down, which opens the in-

strument for aspiration, the piston is drawn out by the handle, *G*; this fills the barrel of the pump with part of the contents of the stomach, which are then ejected through the hose, *C*, by first letting the lever, *F*, loose and then pushing the piston down. A few repetitions of this operation will relieve the stomach of its fluid or masticated contents. The hand, *S*, connected with the lever, *F*, indicates that passage of the instrument *shut* towards which its point is turned. Before attempting to discharge the stomach of its contents a quantity of warm water should be pumped into it, as this will facilitate the operation very much. To charge the stomach merely reverse the action of the pump, having immersed the hose, *C*, into the fluid prepared for this purpose, which should be held in a narrow, deep bowl. The hard rubber screw, *H*, is used for reducing lockjaw or for forcing the mouth open, which is done by screwing it between the jaws.

N. B.—In affixing the tubes to and detaching them from the pump, their metal fittings only should be handled. After the use of gruel, or any thick fluid, wash out the instrument by pumping water through it. If the piston gets hard, and allows water to pass over it, it should be oiled and a little worsted evenly wound around it under the leather, which will render it as perfect as at first.

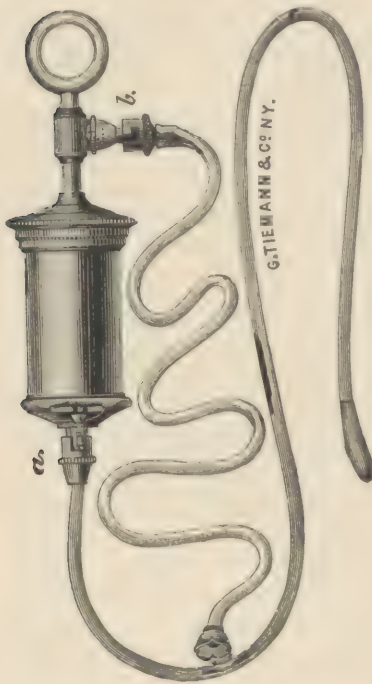
"To feed a patient in spasmodic closure of the jaw, it is well to know that there is behind the last molar teeth a space sufficient for the passage of a small tube into the mouth."—"Medical and Surgical Landmarks." Luther Holden.

Dr. Bowditch has used the lever stomach pump, in connection with trocars, as an aspirator. It may also be used as an injector in severe constipation of the bowels. See "ANAL" and "RECTAL" instruments.

STOMACHAL.

For the Artificial Introduction of Food into the Stomach when Deglutition is Impracticable; for the Evacuation of its Contents in case of Poisoning, &c., and for Lavage.

FIG. 2619.—Tiemann & Co.'s Hollow Piston Stomach Pump.



This stomach pump is made of hard rubber. The piston rod is hollow. When the piston is drawn up, a valve, *a*, opens and admits the fluid into the barrel. Pushing the piston down closes the valve, *a*, at the same time opening a second valve, *b*, through which the contents of the barrel are ejected.

There are two tubes, one for the stomach; the other, with a plunger, for the fluid. These tubes fit on either end of the pump by means of a simple bayonet slide.

When the contents of the stomach are to be *evacuated*, the tubes are fixed as represented in the drawing. They must be reversed if fluid is to be pumped *into* the stomach.

It is a plainer and cheaper instrument than Fig. 2618, but not so durable nor as efficient.

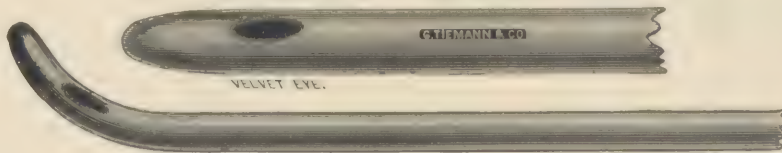
FIG. 2620.—Paine's Nasal Feeding Tube.



For feeding maniacs or persons who are unable or unwilling to open the mouth. This tube is made of soft rubber, with our patent velvet eye. Its advantages are: That the introduction causes no pain; there is no struggling to weary the patient; all the food enters the stomach, and none is thrown about the room; respiration proceeds regularly, and even conversation may continue without hindrance. The objections to it are those against the much-used stomach tube; while, over that instrument, from the non-necessity of forcing open tightly clenched jaws, and because of the inability of the patient to prevent its passage, it holds a true and deserved supremacy. Its adaptability is not confined to cases of melancholia. It

may be used in choking paretics or in paralysis of the throat from any cause; it might be used in fractures of the jaw, when teeth would otherwise be sacrificed, and in cancer of the mouth, or where food cannot be taken readily and naturally.

FIG. 2621.—Tiemann & Co.'s Patent Velvet-Eyed Stomach Tube.

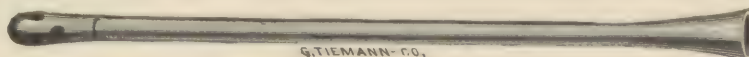


A soft red rubber tube for introduction into the stomach. They are made of various sizes, from one-quarter to three-quarters of an inch in diameter, and from twenty-six to thirty-six inches long. Although very flexible, they are of sufficient firmness to be easily introduced—indeed they may be swallowed.

For feeding, a glass or tin funnel may be attached to the open or top end, into which the liquid is poured (see Fig. 2625). At the bottom it has two fenestræ or eyes, very nicely rounded off (countersunk, beveled edges), making it impossible to injure the mucous membrane either in entering or withdrawal.

This beautifully contrived tube cannot be too highly spoken of. It may also be used in connection with any stomach pump for rinsing the stomach (lavage.)

FIG. 2622.—Funneled Feeding Tube (English).

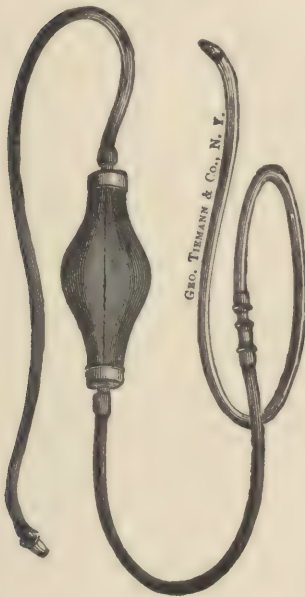


All of the above tubes may be used with funnels, or may have an attachment for the stomach pump.

STOMACHAL.

For the Artificial Introduction of Food into the Stomach when Deglutition is Impracticable; and for the Evacuation of its Contents in case of Poisoning, &c., and for Lavage.

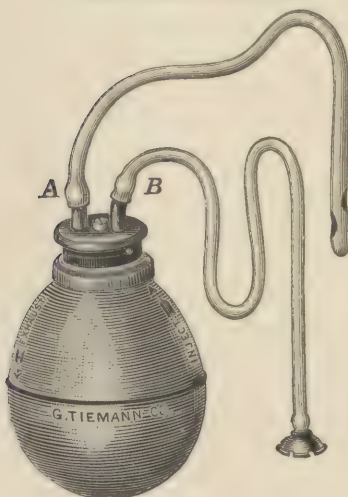
FIG. 2623.
Toswill's Syphon Stomach Pump,
with Tiemann & Co.'s
Patent
Velvet-Eyed Stomach Tube.



The instrument consists of an india rubber tube, about half an inch in diameter and some four feet in length, provided with a ball of the same material, which is two or three inches in diameter, and situated about eighteen inches from one end of it. In fact, it is almost a *fac-simile* of an enema syringe, but without a valve. To the other end a Tiemann & Co.'s patent velvet-eyed stomach tube is attached. Let us suppose the instrument to be used in a case of poisoning where it is desired to wash out the stomach as speedily as possible. The patient being seated in a chair, or reclining on a couch, the stomach tube is oiled and then passed back in the mouth in the usual way until it has reached the upper part of the pharynx. Its passage down the œsophagus, as in the case of a catheter in the urethra, is effected by twisting it round and round in the hand until it has reached the stomach. We need scarcely point out how much less pain this soft flexible tube must cause than the hard somewhat inelastic tube generally used. The rest of the instrument is now adjusted to the stomach tube (the work of a second), and then a jug of water being obtained, the end of the tube beyond the ball is introduced into it. The operator with one hand pinching the india rubber tube somewhere between the ball and the patient's mouth, with the other hand compresses the elastic ball, and thus forces out some of the air contained in it, which bubbles up through the water into the jug. When this has been repeated two or three times, all the air is forced out, and the ball becomes filled with water. If the jug be now raised a foot or two above the patient's stomach, and pinching of the tube discontinued, the instrument acts at once as a syphon, and the water flows from the jug in a continuous stream into the patient's stomach. When enough has been introduced, the tube is pinched somewhere between the ball and the patient's mouth, and the flow of water into the stomach is at once stopped, the water being retained in the ball by atmospheric pressure. If the end of the tube be now taken out of the jug and put into a basin below the level of the patient's stomach, upon the pinching of the tube being discontinued the contents of the stomach will at once flow out into the basin in a continuous stream, the instrument acting of course again as a syphon, only in the reverse way to that previously. When it is believed that the stomach is nearly empty, the tube is pinched between the ball and the basin, the end of the tube put back into the jug, and the whole thing repeated over again. The object of pinching the tube when the end of it is being shifted from the jug to the basin, and *vice versa*, is of course to retain the water in it by means of the atmospheric pressure, thus enabling it to act as a syphon. In case the holes at the end of the stomach tube become clogged with food, they can be easily freed by pinching the tube between the ball and the jug; compression of the ball will then force out the fluid contained in it, and thus clear the holes. In conclusion we would draw special attention to the low price at which this instrument can be obtained. The great majority of general practitioners do not possess a stomach pump. This is chiefly due to the high price of the instrument hitherto used. This objection being now removed, there can no longer be any excuse for any practitioner being unprovided with an instrument, the want of which may materially tend to lessen the chances of recovery in a case of poisoning.

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FIG. 2624.—Tiemann & Co.'s
Patent Gastro-Mundator.



The gastro-mundator is a very convenient instrument for *lavage* or simply cleansing of the stomach, for drawing off poison, and for artificial or forcible feeding.

The end with the plunger, *B*, is always the external one. The patent velvet-eyed œsophageal tube enters the stomach by the mouth or nose. The ball is worked like the common well-known injecting apparatus—by turning the ball below the hard rubber neck, the valves are made to change position; so that, without being obliged to disconnect the tubes as in other apparatus, we can first fill the stomach and then, by merely turning the ball to the opposite arrow, empty it again, and so on *ad infinitum*.

The instrument can be safely placed in the hands of patients who are treated for affections of the stomach.

STOMACHAL.

For Artificial or Instrumental Introduction of Food into the Stomach, and the Evacuation of its Contents, in case of Poisoning, and for Rectal Infusion.

FIG. 2625.
Ilegar's Infusor.

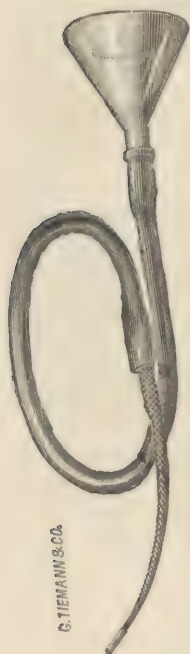


FIG. 2628.—Korup's Infusor.

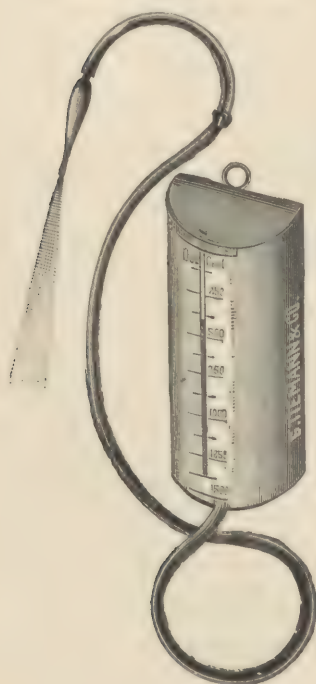
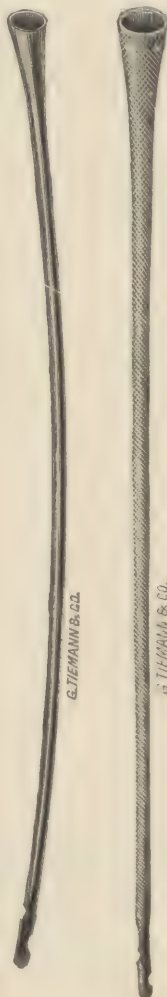


FIG. 2626. FIG. 2627.
Stomach Tubes.
French. English.



Over the nozzle of a glass, metal or hard rubber funnel the end of a soft rubber tube of convenient length is slipped, the other extremity of which is attached in like manner to a stomach or rectal tube.

For Lavage of the Stomach.

"The introduction of the stomach tube is easy in most cases. You stand in front of the patient, make him open his mouth and protrude the tongue. You then introduce the tube into the pharynx. When it reaches the base of the tongue you ask your patient to swallow, and, during the movements caused by the effort, you advance the tube into the œsophagus; when the first part of the œsophagus is freely entered, you can push the tube easily and with more rapidity down into the stomach. For facilitating the descent of the tube, it has been advised to make them slippery by application of oil, vaseline or glycerine; but, as fatty substances often leave a disagreeable taste, it is better to immerse the tube in Vichy water or milk.

"The tolerance of the pharynx, œsophagus and stomach becomes easily established; after three or four seances patients never object to the presence of the tube; they are soon able themselves to introduce the tube and conduct the washing. As to the quantity of the liquid to be employed, it varies and depends on the degree of dilatation and tolerance of the stomach; some patients will allow two, three, four and even five litres to enter, with others five hundred grammes excite efforts to vomit. Those who are capable should continue the lavage of the stomach until the liquid runs out as limpid as when it entered the tube. The return jet of liquid will sometimes cease to run on account of presence of particles of food closing the eyes of the tube; it suffices to let a little water run into the stomach to displace the obstacle.

"To completely empty the stomach of the liquid that has been introduced, bring into play the abdominal muscles and the diaphragm, and assist the careful efforts of these by pressure of the hands on the abdomen. If, in cases of greatly dilated stomachs, when the tube has been introduced too deeply, the extremity thereof curving up, the eyes rising to the superior part of the stomach the syphon ceases to act, you may correct by withdrawing the tube a little occasionally.

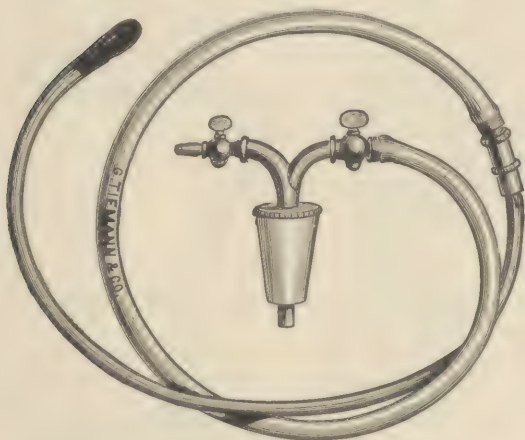
"During the first introduction of the tube, certain phenomena are observed, the most important of which is dyspnœa. The patient's eyes become injected, his face reddens and he claims he cannot breathe. I cannot recommend too strongly to encourage your patient to breathe during the introduction of the tube, as well as during the time it remains in the stomach.

"Besides dyspnœa, nausea and vomiting are sometimes caused by the introduction of the tube. As soon as the first portion of the œsophagus or the stomach of certain sensitive patients is entered, a discharge is excited. By administering bromide of potassium internally, and making local pharyngeal applications of the salt during the three or four days preceding the first 'lavage' of the stomach, this accident is avoided."—From a lecture by Dr. Dujardin Beaumetz. O. Doin. Paris: 1883.

STOMACHAL.

For Artificial or Instrumental Introduction of Food into the Stomach, and the Evacuation of its Contents, in case of Poisoning, Lavage, &c.

FIG. 2629.
Stomach Tube, with Aspirator Attachment.



"According to Debove there is no relation between the appetite of patients and their digestive faculties. The food introduced into the stomach artificially may be tolerated and digested, no matter how sensitive the pharynx may be.

"If carefully studied and employed, I believe alimentation with Debove's stomach tube will be found efficacious in some cases of vomiting of pregnancy where all other means fail."—*Medical Record*, January 2, 1886. H. B. Millard, M. D.

See also ALIMENTATION BY THE RECTUM, p. 303.

FIG. 2630.—Hard Rubber Oral Screw, to aid in Forcible Introduction of Stomach Tubes.

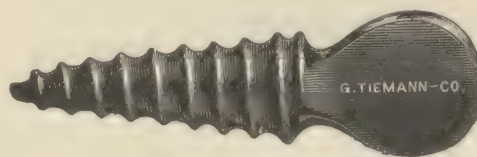
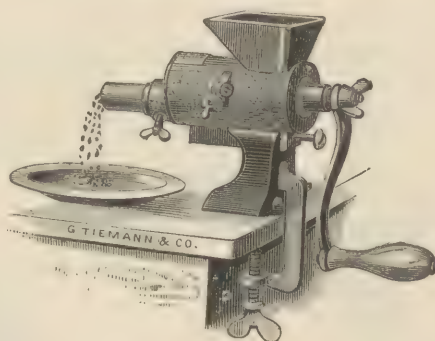


FIG. 2631.—Masticator.



For mincing meats. Useful to persons who have lost their teeth, or who are unable to masticate by reason of accident, disease or old age. Also for preparing the food to be conveyed by means of the stomach pump.

ANAL AND RECTAL.

RECTUM AND ANUS.

"*Rectum*, from *rectus*, 'straight,' so called from a notion that it is straight, which it is not. *Intestinum rectum*, *apenthysmenos*, *euthyen-teron*, *longaon*, *longas*, *longanon*, *archos*, *cyssaros*, *princeps*, *monocolon*, *bumgut* (prov.), *joigut*. The third and last portion of the great intestine. It forms the continuation of the sigmoid flexure of the colon, occupies the posterior part of the pelvis, and extends from the left side of the sacro-vertebral articulation to the coccyx, before which it opens outwards by the opening called the *anus*. It is cylindrical, but saccated as it were, at its inferior portion, where it is consequently larger, and is attached to the sacrum by the mesorectum. Like the other portions of the canal, it is formed of three membranes. Towards the lower extremity some parallel and longitudinal wrinkles are observable on its inner surface: these are the *columns*, *columnæ carneæ* of the rectum or of *morgagni*. They are merely folds of the mucous membrane, between which are a number of *lacunæ*. The arteries of the rectum are numerous. They proceed from the inferior mesenteric, hypogastric and internal pudic, and are called *hemorrhoidal*. The veins open partly into the hypogastric vein, partly into the inferior mesenteric. The nerves proceed from the sciatic and hypogastric plexuses. The rectum receives the *fæcal* matters, as they pass from the colon, which serves as a reservoir for them."—Dunglison.

"*Anus*.—One of the most important landmarks which guide a surgeon in his operations about the anus, is a white line at the junction of the skin and mucous membrane. It is easily recognized and is of especial interest, because it marks with great precision the linear interval between the external and internal sphincter muscles. From this line the internal sphincter extends upwards, beneath the mucous membrane, for about an inch, becoming gradually more and more attenuated. The wrinkled appearance of the anus is caused by the contraction of the external sphincter. At the bottom of these cutaneous folds, especially toward the coccyx, we look for *fissure of the anus*."—"Gray's Anatomy."

ANAL AND RECTAL.

EXAMINATION.

"For making a rectal examination, which shall be at the same time thorough and as free from pain as possible, two things are necessary above all others: a good bed or table and a good light. For a table, a strong four-legged one, upholstered with hair and leather, answers every purpose; it should be hard, without springs, and about thirty inches in height. In place of this any of the examining tables of the gynæcologist may be used (see pages 51 to 55). Either natural or artificial light may be used, but the latter is on some accounts preferable, being always at command and easily thrown up the bowel or concentrated upon a particular point. The lamp which I have found most convenient is a modification of Tobold's laryngoscope (see page 257).

"The instruments necessary are: specula of various forms, bougies, a Davidson syringe, ointment, cotton, sponge-holders, brushes, a cup for fusing nitrate of silver, an applicator of some metal easily bent, around the end of which cotton may be twisted, towels, basins, &c., and these should all be placed within easy reach of the hand. In the matter of probes almost every variety is useful, from the hard rubber uterine probe to the finest wire of pure silver; and directors also should be of many sizes." See "Diseases of the Rectum and Anus." Kelsey. 1884.

SPECULA.

For Presenting the Parts to View, Facilitating Examination, Exploration, Applications and Operations.

FIG. 2632.—Tiemann & Co.'s Trivalve Speculum Ani.



FIG. 2635. Ferguson's Tubular Speculum.



FIG. 2634.—Bodenhamer's Reflector and Lens.

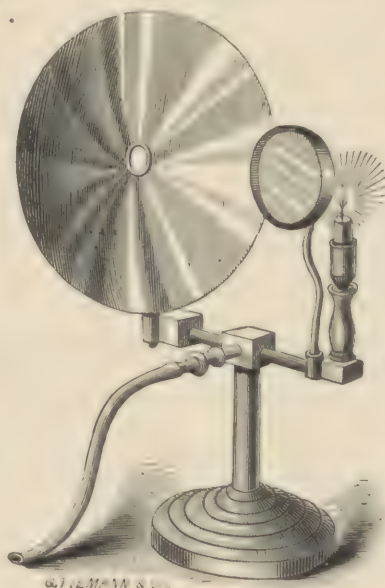
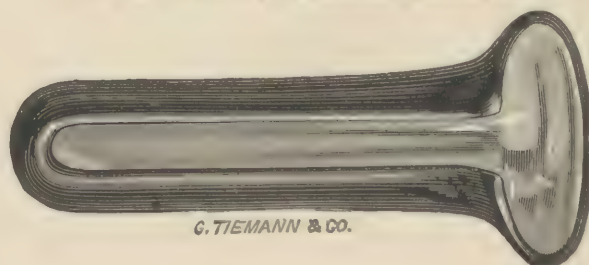


FIG. 2633.—Trivalve Trellis Speculum Ani.



FIG. 2636.—Ashton's Fenestrated Speculum Ani.



ANAL AND RECTAL.

SPECULA.

For Presenting the Parts to View, Facilitating Examination, Exploration, Applications and Operations.

FIG. 2637.—Van Buren's Rectal Speculum.

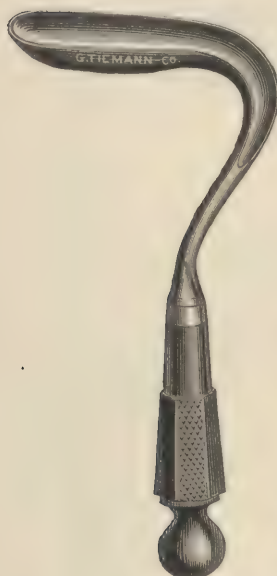


FIG. 2638.—Kelsey's Rectal Speculum.

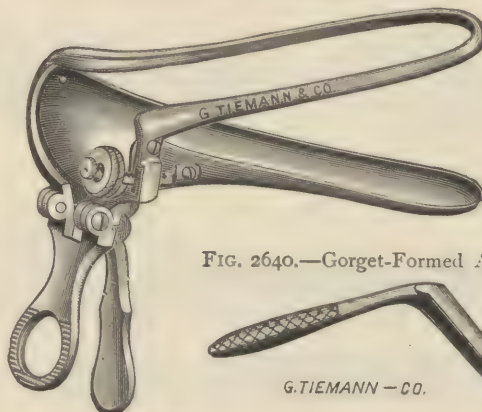


FIG. 2639.—Helmuth's Rectal Speculum.

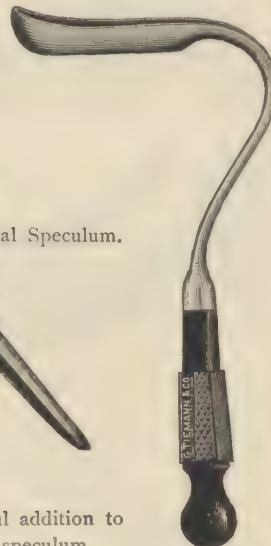


FIG. 2640.—Gorget-Formed Anal Speculum.

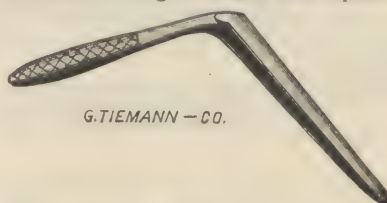
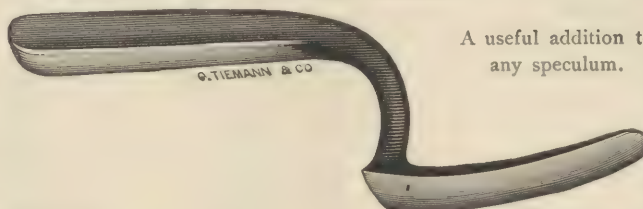


FIG. 2641.—Van Buren's Rectal Depressor.



A useful addition to any speculum.

FIG. 2642.—Bivalve Speculum Ani.

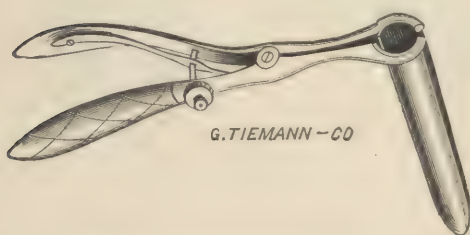


FIG. 2643.—William's Rectal Speculum.

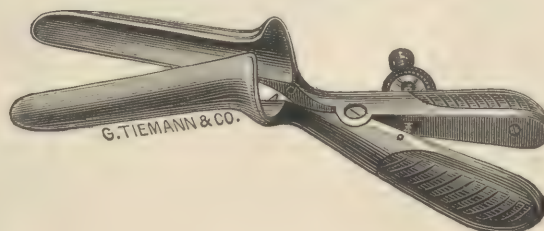
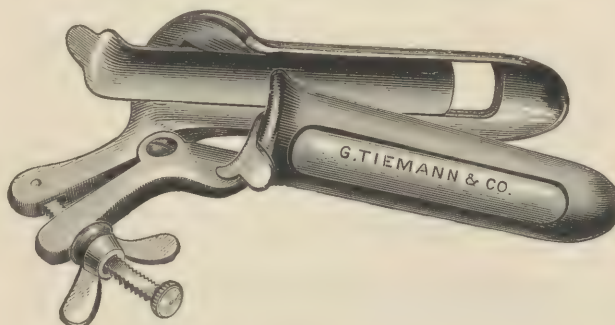


FIG. 2644.—O'Reily's Rectal Speculum.



FIG. 2645.—O'Neil's Rectal Speculum, employed while Injecting for cure of Hæmorrhoids.



ANAL AND RECTAL.

SPECULA, DILATORS AND RECTO-COLONIC ENDOSCOPE.

For Facilitating Examination, Exploration, Applications and Operations.

FIG. 2646.—Rectal Dilator.



FIG. 2647.—Anal Dilator.



FIG. 2648.
Sims' Rectal Speculum.



FIG. 2649.—Small Bivalve
Anal Speculum,
for Children.



FIG. 2650.—Sims' Anal Dilator.



FIG. 2652.
Thebaud's Sphincter-Ani Dilator.

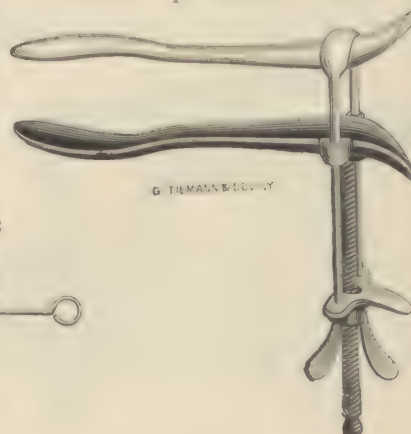
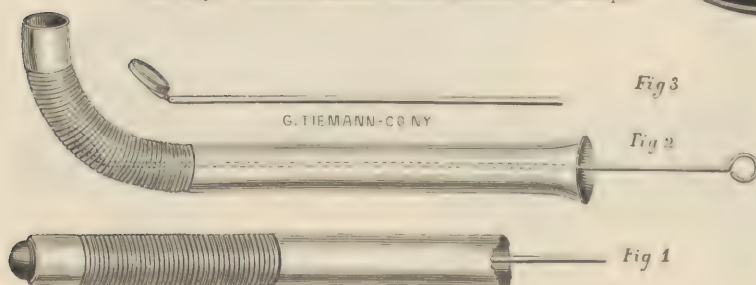


FIG. 2651.—Bodenhamer's Recto-Colonic Endoscope.



ANAL AND RECTAL.

SOUNDS AND BOUGIES.

For Examination by the Sense of Touch above the reach of the Finger and for Dilatation of Strictures.

FIG. 2653.—Vertebrated Recto-Colonic Exploring Sound.



FIG. 2654.—English Rectal Bougie, Cylindrical. 12 sizes.



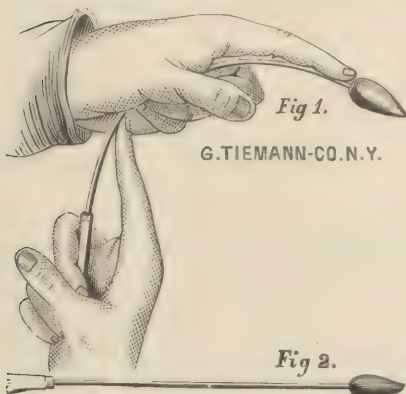
FIG. 2657.—Kelsey's Soft Rubber Rectum Bougie.



FIG. 2655.—English Rectal Bougie, Conical Point. 12 sizes.



FIG. 2656.—Bodenhamer's Rectal Exploring Sounds or Bougies (10 sizes).



"For examination by the sense of touch, above the reach of the finger, recourse may be had to bougies. These are of all forms, sizes and materials, and, in general words, the softer the instrument the better it is for examination. These instruments are made of twelve different sizes and for the purpose of diagnosis the medium sized is the best. The old-fashioned red English hard-rubber bougie is unnecessarily stiff and dangerous, and should be discarded, having no advantages over the softer ones, either for the purpose of diagnosis or for that of treatment. The *bougie à boule*, made of hard rubber with a flexible stem, is a favorite instrument with many. For my own use I have had a kind of bougie made by Messrs. Stohlmann, Pfarre & Co. (branch of Geo. Tiemann & Co.) which I prefer to all others, for the simple reason that it is softer and more flexible than any in the market. It is made of the same material as their red soft rubber catheters and differs from them only in size and in the thickness of its walls; with such an instrument one is pretty certain not to perforate the bowel, and for diagnosis it answers every purpose as well as the harder instruments. The better fitted a bougie is for pushing its way through a stricture, the worse it is for rectal exploration. Every bougie intended for exploration should be perforated, so that a stream of water may be injected through it."—"Diseases of the Rectum and Anus." Kelsey. 1884.

ANAL AND RECTAL.

STRICTURE BOUGIES.

For Examination by the Sense of Touch above the reach of the Finger and for Dilatation of Strictures.

FIG. 2658.—Whitehead's Improved Instrument for Dilatation of Stricture of the Rectum by Elastic Pressure.



Wales' Set of Rectal Bougies, Sheath and Syringe.

FIG. 2659 (6).—Wales' Soft Rubber Recto-Colonic Bougie.

FIG. 2660 (8).
Wales' Rectal
Bougie and Sheath.

FIG. 2661 (7).
Wales'
Rectal Bougie.

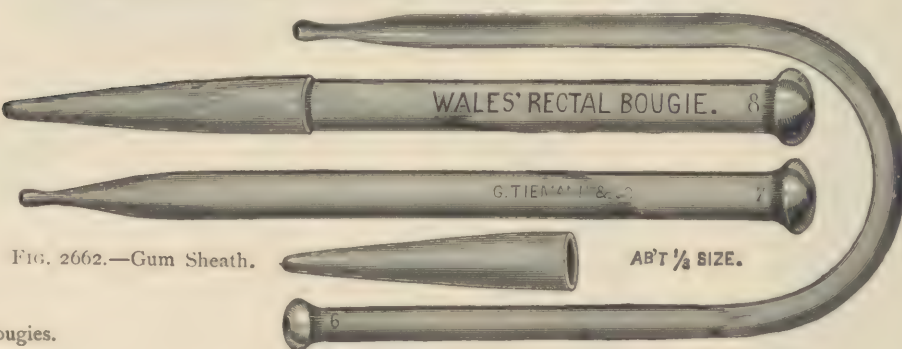


FIG. 2663.
Sizes of Rectal Bougies.

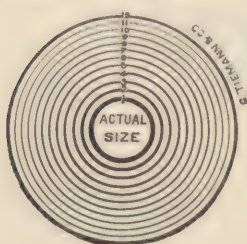


FIG. 2664.—Rubber Bag Syringe.



The Application of Wales' Bougies for Dilatation of Rectal Strictures.

"* * * With the view of obviating all possible objections to mechanical dilatation, I devised, for the first time, in 1876, rectal bougies made of *pure gum* (not, as heretofore, of gummed cloth webbing or other materials) of exceeding flexibility, smoothness, and varying in size.

"A conduit runs through the centre and terminates in the point of the bougie, for the purpose of commanding a stream of water that might be required at any moment to facilitate the introduction of the instrument. The points of the bougies are made in various shapes, spherical, conical and olivary, with the view of meeting the necessities of special cases. The surface is perfectly polished, which, by reducing friction, increases the facility of introduction and eliminates the unpleasant sensation of dragging caused by a rough instrument.

"The method of introducing the bougie is simple. The patient, after the bowels have been cleaned out by injection, is placed, reclining on his left side, upon an ordinary operating table, the thighs flexed, and the buttocks just overhanging its lower edge. The smallest sized instrument likely to pass the stricture is smeared with grease, its point inserted into the anus and gently pushed onward in the following manner: The right hand grasping the bougie close to the anus, the whole perineum is pressed upwards, which will advance the point of the instrument; the left hand now steadies it while the right is slid downwards for a lower hold, the perineum, of course, settling with it; the bougie is again pushed forward in the same manner until the obstruction is passed. I have occasionally found that this manœuvre may be greatly facilitated by sinking the fingers of the left hand deep into the left iliac region and drawing

ANAL AND RECTAL.

STRICTURE BOUGIES.

The Application of Wales' Bougies for Dilatation of Rectal Strictures. (Continued.)

upwards, as though an effort was being made, so to speak, to stretch out the sigmoid flexure, while pressure is made at the same time upon the bougie in the manner described. Another practical point of prime importance is to employ a stream of water, as warm as can be comfortably borne, propelling it through the conduit of the instrument, whenever its point is arrested for any cause. The water, flowing from the distal aperture, will distend the bowel, efface its folds, and break down any hardened fæces which may exist, obstructing the ascent of the bougie. An assistant may manage the syringe (Fig. 2664), throwing in the water in such quantities as may be needed, while the operator is engaged with the bougie. It must be borne in mind, however, that no great volume should be used at once, otherwise the bowel will be excited to energetic contraction, and compel the instrument to be withdrawn before it has been properly lodged. In preliminary trials, the bougie may be permitted to remain two or three minutes, and afterwards, when greater tolerance is established, a longer stay may be allowed. I rarely exceed five minutes in any case, even when the patient makes no complaint of irritation or pain. After several introductions of one size of the bougie, say number seven or eight, the next largest may be taken, and so on until the stricture has been sufficiently dilated.

"The application of the instrument may be repeated twice or thrice a week, according to circumstances, such as the irritability of the rectum, temperament of the individual, and intercurrent attacks of diarrhoea or other trouble. Twice a week, in my experience, suffices in most cases; a fortunate issue, if attainable, can only be brought about by patient and prolonged treatment.

"Rudeness or violence inflicted with the view of hastening the case can effect nothing but harm, and may jeopardize the life of the patient. If the instruments be hastily thrust into the bowel it may be perforated, especially in those cases in which inflammatory softening or ulceration exists; or, if it be too large, the rectal mucous membrane may be ruptured, giving rise to smart hæmorrhage; or the entire wall of the bowel may be ruptured into the peritoneum, an accident that is pretty sure to be followed by peritonitis, with all of its attendant dangers. But these funest consequences are infinitely less liable to follow the use of india rubber bougies than of any other sort, for certainly, *a priori*, nothing could furnish a milder, more equable and less dangerous force than these; and experience shows this to be the fact.

"It often happens that, after the most patient devotion to this method of treatment, the bowels do not regain their functions, even after the largest sized bougie has been passed with ease. This result is due in part to long continuance of the expanded condition of the bowel above the stricture, by which its muscular walls have been more or less paralyzed.

"A very gentle pressure can also be obtained by converting the bougie into a dilator. For this purpose I had each bougie provided with a gum sheath (Fig. 2662) which accurately fitted it. Thus prepared, by adjusting a rubber bag or an ordinary syringe to the butt of the bougie, air or water may be thrown into the sheath its whole length, or into any section of it, by tying a silken ligature about the instrument at the point to which it is desired to restrict the dilatation. It is not desirable to distend the sheath largely, not more than will represent the diameter of a bougie two sizes larger than the one in actual use. The sheaths, under this degree of pressure, will expand uniformly or cylindrically, while a greater degree will cause it to bulge irregularly, or burst it. In the latter case, however, there is no danger, as a low thud and a peculiar sensation felt by the patient at the moment announce the accident, and may alarm nervous persons. The amount of pressure above stated is all-sufficient, and, therefore, those instruments, of which there are numerous forms, specially contrived to gain great mechanical power, are both unnecessary and dangerous. Since I first brought to the notice of the profession rectal bougies made of pure gum, I have used them many hundred times, and they are employed now, I believe, to the exclusion of all others. I have neither myself seen any inconvenience or dangerous results follow, nor have I heard of any accident occurring in other hands. Some of my friends had, however, expressed a suspicion that, being so soft and flexible, they were likely to deceive by doubling in the intestines instead of slipping along the mucous membrane; but in all cases, except in very adipose subjects, when the bougie is properly lodged, it can be felt through the abdominal walls lying straight along the lumen of the bowel. * * *"—
"Stricture of the Rectum." By Philip S. Wales, M. D. *The Medical Chronicle*, Baltimore, January, 1883.

ALIMENTATION BY THE RECTUM. INFUSION, INJECTION.

FIG. 2665.—Tiemann & Co.'s Patent Rectal Feeding Tube (Soft Rubber, Velvet Eye).
May be used with funnels (see page 296), or may have an attachment for the stomach pump (page 293).



"Alimentation by the rectum is required in diseases of the œsophagus preventing swallowing and in diseases of the stomach which prevent the retention or ingestion of food; in this manner life may be maintained for long periods. The nutritive injection should be composed of materials which need no digestion, as milk, eggs, mutton and chicken broths."—"Operative Surgery." Stephen Smith. 1880,

ANAL AND RECTAL.

ALIMENTATION BY THE RECTUM. INFUSION, INJECTION.

"Pancreatic meat emulsion should be made as follows : To five to ten ounces of finely-chopped meat add one-third that weight of the fresh pancreas of the ox ; remove the fat and mix with about five ounces of water, and reduce the whole to the consistence of a thick soup. Or, the following preparation may be used : Crush or grind a pound of beef muscle fine, add one pint of cold water, allow it to macerate three-fourths of an hour ; now raise it to the boiling point and let it boil two minutes and stand. The quantity used should be three or four ounces every four hours, and it should be tepid. The bowels should first be moved by a laxative or enema. The injection should be very gently thrown into the rectum."—"Operative Surgery." Stephen Smith. 1880.

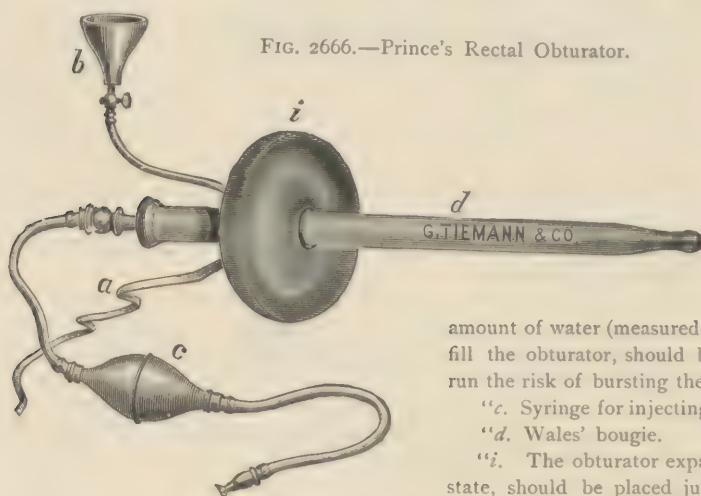


FIG. 2666.—Prince's Rectal Obturator.

Anal or Rectal Stopper in position
upon a Wales' Bougie.

"a. Tape attached to the obturator, for withdrawing it after its collapse. The tape or thread may also be passed through the central opening and around over the circumference, and then be tied so as not to be lost.

"b. Funnel attached to the pipe, arranged for filling the obturator. This can be replaced by a syringe. In using a syringe the

amount of water (measured by the bulb of the syringe) necessary to fill the obturator, should be previously ascertained, in order not to run the risk of bursting the obturator by over pressure.

"c. Syringe for injecting fluids into the rectum.

"d. Wales' bougie.

"i. The obturator expanded with water. This, in the collapsed state, should be placed just within the anus. A piece of dentist's elastic rubber dam slipped upon the bougie down to the position of the obturator facilitates its entrance through the anus. The greater approach to a wedge shape enables the obturator to pass the sphincter more easily."

"1. For enabling the alimentary canal to hold two or three gallons of water in cases of obstinate constipation, in cases of obstipation and of strangulation ; or, for the speedy and complete washing out of the alimentary canal on any account.

"2. For the holding in the alimentary canal of comparatively large amounts of nutritious fluids in cases in which the introduction of food by the mouth is impracticable.

"3. For the holding in the large intestine of an adequate quantity of alcoholic liquids introduced for anæsthesia in surgical operations or injuries, or for the alleviation of shock or terror from any cause, or in all conditions in which alcoholic anæsthesia is desirable.

"4. For the speedy dilution of the blood through the absorption of water from the intestinal surfaces in order to stimulate the kidneys to filter out any poisonous constituents of the blood, whether these impurities have been introduced by accident or design, or whether they have developed in the blood and in the glands by the chemical process incident to disease.

"5. For the reduction of temperature in fever and inflammation by the more ready discharge, through the various emunctories, of irritating material by the thinning of the blood through the introduction of water.

The obturator is to be filled with air or water, and is intended to be of such a size as to fill the lower part of the anus and act as a valve, so that the greater the pressure is above, the tighter it will fit. It should be placed upon the bougie previous to its introduction. The bougie is then worked up as far as convenient and the obturator pushed in through the sphincter, and after being inside the sphincter it should be injected with warm water or blown up with air. It is probably better to use water because it is not so likely to leak away as air ; you then fasten to the tube some kind of syringe and fill the large intestine. The practicability of securing a disentanglement of a strangulated intestine (the obstruction being occasioned by a loop of intestine caught under a bridge, which may be the result of a previous inflammation, or occasioned by intussusception, in which the upper portion of the intestine is drawn into the lower) has been established by many successes. Where the obstruction is below the ileo-coecal valve, there can be no doubt of the ability, with the obturator, to fill the large intestine below the obstruction and exert an influence to disentangle it. It is not to be supposed that all the attempts will be successful, for there may be such adhesions as to make it impracticable."—David Prince, M. D. *St. Louis Medical and Surgical Journal*, February, 1883.

ANAL AND RECTAL. IRRIGATORS.

FIG. 2667.—Maw's Enema Pump.

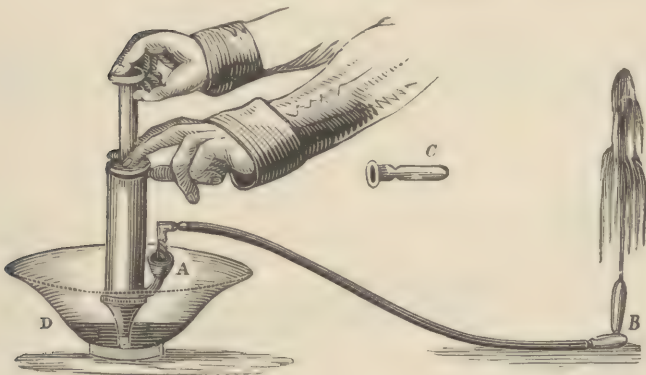


FIG. 2668.—Syphon Syringe.

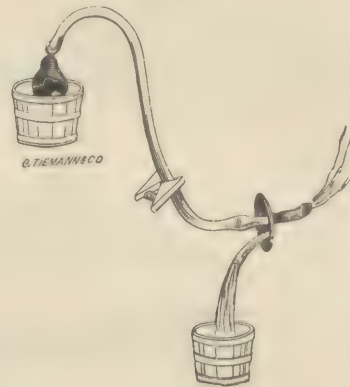


FIG. 2669.—Recto-Colonic Enema Apparatus, consisting of a Force-Pump with a Colonic Tube attached, for Injecting or Forcing Fluids both into the Rectum and Colon.

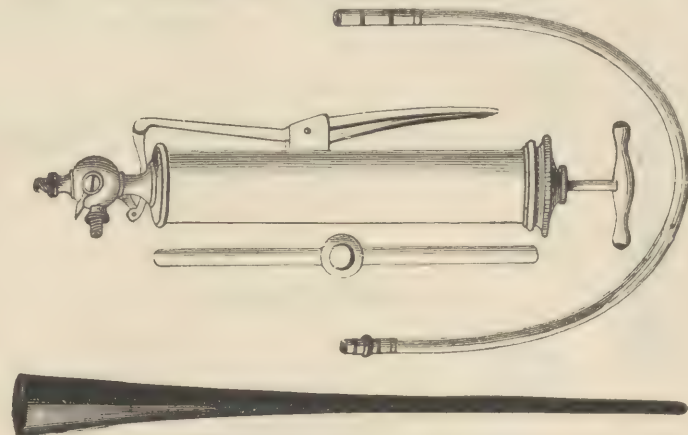


FIG. 2670.—Clendinen's Rectal Irrigator.

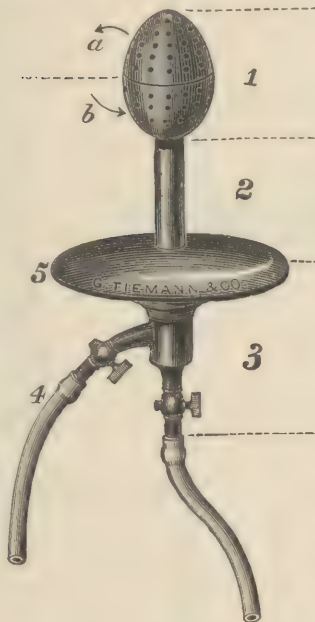
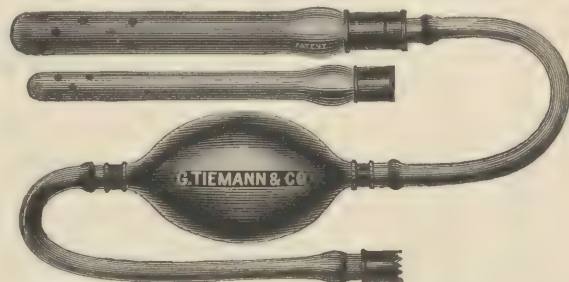


FIG. 2671.—Parker's Vaginal and Rectal Syringe, with Tiemann & Co.'s Patent Velvet-Eye Soft Rubber Tubes.



Parker's syringe is made entirely of rubber, and the vaginal and rectal tubes are perfectly flexible. There is no terminal orifice, but the sides are perforated with "velvet eyes" for a distance of nearly two inches from the end. These rubber syringe points do not lacerate the mucous membrane, nor produce the injury so often caused by hard metallic tubes. The bulb and tubes are *large*, and insure a copious supply of water.

FIG. 2672.—Munde's Rectal Irrigator.

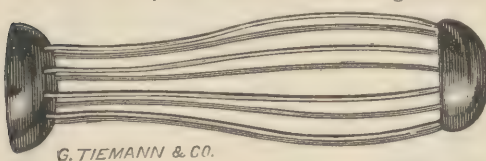


FIG. 2673.—Bodenhamer's Rectal Irrigator.



On hand all sizes of metal and hard rubber syringes of universally-known styles, also Davidson's and other bag syringes.

ANAL AND RECTAL.

STRICTURE.

Fissure and Fistula Knives, Directors, Scarifiers, &c.

FIG. 2674.—Bodenhamer's Blandin's Knife, for making the Sub-mucous and Sub-cutaneous Section of the Sphinctores Ani muscles, in Anal Fissure.



TIEMANN & CO.

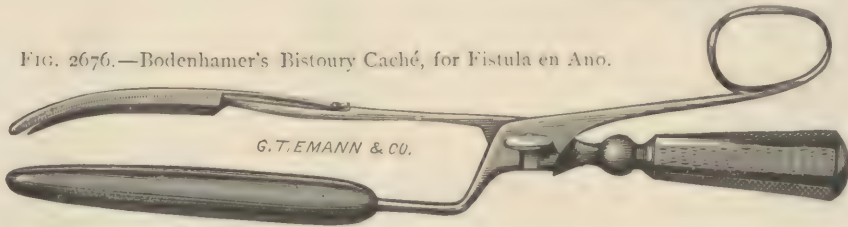
FIG. 2675.—Bodenhamer's Anal Fissure Knife.



G. TIEMANN & CO.

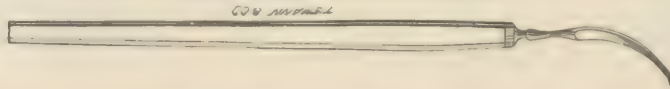
(See WALES "RECTOTOME AND HERNIATOME," Fig. 2761, page 316.)

FIG. 2676.—Bodenhamer's Bistoury Caché, for Fistula en Ano.



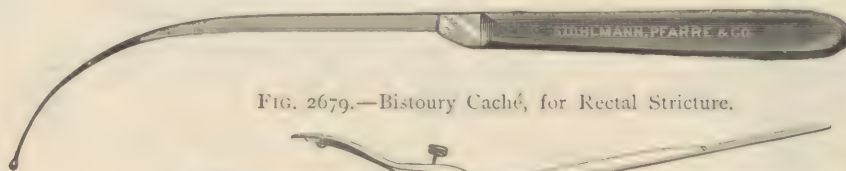
G. TIEMANN & CO.

FIG. 2677.—Small Blunt-Pointed Curved Bistoury, for Incising Preternatural Pouches or Sacculi of the Rectum.



G. TIEMANN & CO.

FIG. 2678.—Kelsey's Knife, for Fistula en Ano.



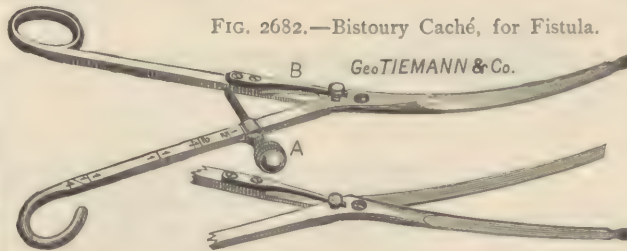
TIEMANN, PFARR & CO.

FIG. 2679.—Bistoury Caché, for Rectal Stricture.



G. TIEMANN & CO.

FIG. 2682.—Bistoury Caché, for Fistula.



Geo. TIEMANN & Co.

FIG. 2683.—Sharp-pointed Straight Bistoury.

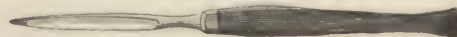
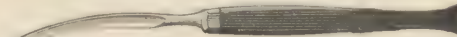


FIG. 2684.—Round-pointed Straight Bistoury.



FIG. 2685.—Probe-pointed Curved Bistoury.



G. TIEMANN & CO. N.Y.

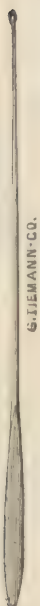
FIG. 2686.—Sharp-pointed Curved Bistoury.



FIG. 2687.—Cooper's Hernia Knife.

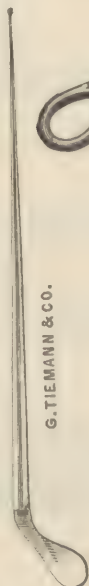


FIG. 2688.—Elastic Probe.



G. TIEMANN & CO.

FIG. 2689.—Flexible Silver Director, grooved and probe-pointed.



G. TIEMANN & CO.

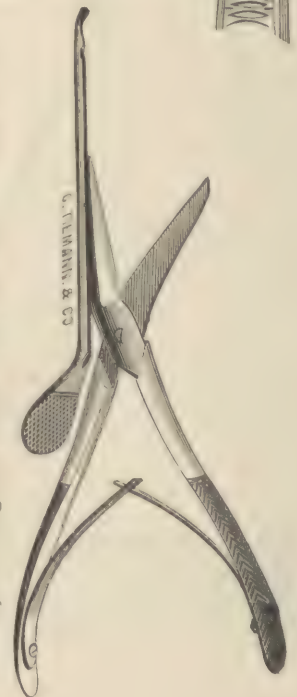
FIG. 2680.—Rectal Scarificator.



FIG. 2681.—Kelsey's Proctotomy Knife.



FIG. 2690.—Allingham's Scissors and Director, for Fistula en Ano.



ANAL AND RECTAL.

DRESSING.

For Removal of Foreign Bodies and the Application of Remedies.

FIG. 2691.—Kelsey's Scoop, for removing Impacted Faeces.



FIG. 2692.—Rectal Curette, for scooping out the Rectum in Atony or Paralysis of that organ, and also for removing Ascarides of the Rectum.



FIG. 2693.—Forceps, for extracting Concretions and other Foreign Substances from the Rectum.

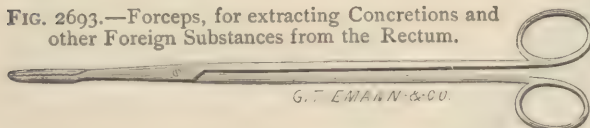


FIG. 2694.—Kelsey's Applicator (flexible metal, around the end of which cotton may be twisted).



FIG. 2695.—Silver Probe.



FIG. 2696.—Silver Probe.

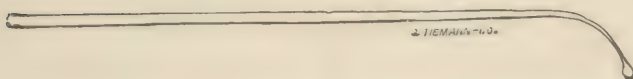


FIG. 2697.—Rectal Brush Holder (stem of flexible wire).



FIG. 2698.—Hutchinson's Improved Breech-loading Syringe, for administering semi-solid substances into the Rectum, &c.

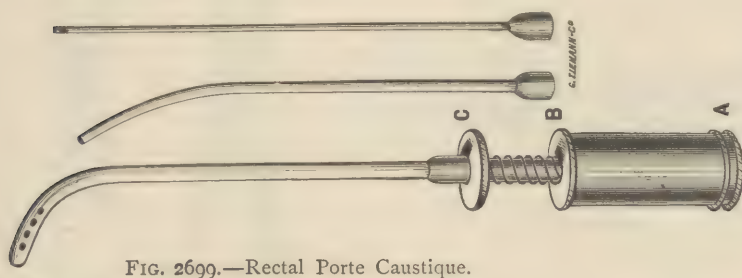


FIG. 2699.—Rectal Porte Caustique.

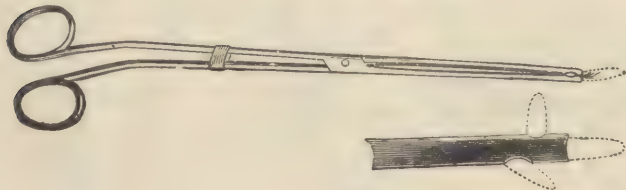


FIG. 2700.—Lente's Platina Cup, for fusing Nitrate of Silver.



FIG. 2701.—Suppository (Hard Rubber).

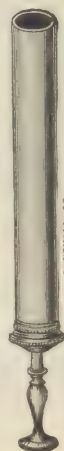


FIG. 2702.—Rectal Sponge-Mop Holder.



FIG. 2703.—Small Trocar and Acupuncture, or Exploring Needle (for testing the character of ambiguous swellings or fluid collections of the Rectum).



FIG. 2704.—Rectal Insufflator (for blowing powdered substances into the Rectum, when well opened by the speculum).



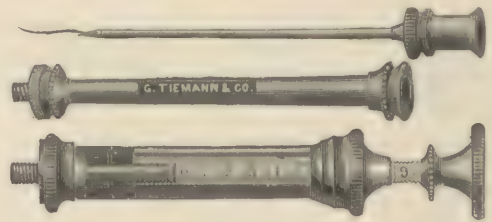
ANAL AND RECTAL.

HÆMORRHOIDAL.

FIG. 2705.—Kelsey's Hypodermic Syringe, for Injecting Hæmorrhoids.



FIG. 2706.—Adams' Hæmorrhoidal Syringe.



The Treatment of Hæmorrhoids by Injection.

Dr. Kelsey, of New York, again urges the treatment of hæmorrhoids by injection of carbolic acid. After an ample experience this has become his routine practice, and in all his cases he has never known a patient to abandon the treatment after it was begun, and he has never failed to effect a perfectly satisfactory cure by it, and he has never had an accident of serious nature with it. He uses three solutions, one of fifteen per cent., one of thirty-three per cent., one of fifty per cent., and sometimes he uses the pure acid.—*American Journal of the Medical Sciences.*

FIG. 2707.—Syringe for Injecting Hæmorrhoidal Tumors, as used by Dr. O'Neal.

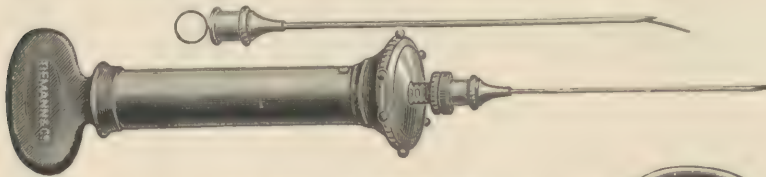


FIG. 2708.—Angular Pile Scissors.

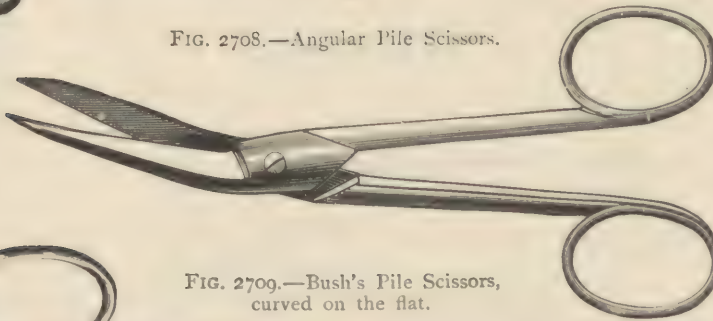


FIG. 2709.—Bush's Pile Scissors, curved on the flat.

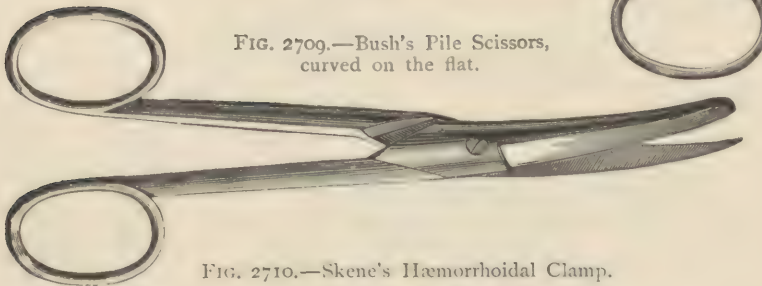


FIG. 2710.—Skene's Hæmorrhoidal Clamp.

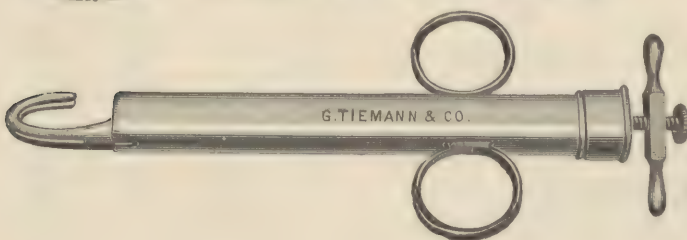


FIG. 2711.—Byrne's Double Spring Tenaculum, for Pulling Down the Rectum.



ANAL AND RECTAL.

HÆMORRHOIDAL.

FIG. 2712.—Sims' Needle Forceps.

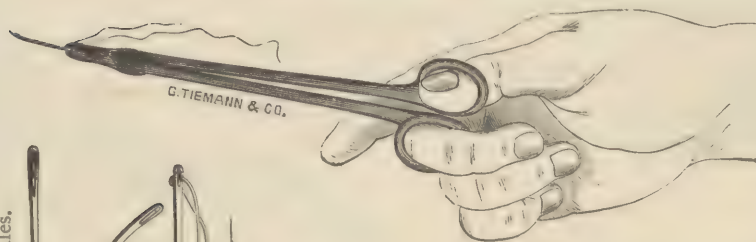


FIG. 2715.—Ruptured Perineum Needle.

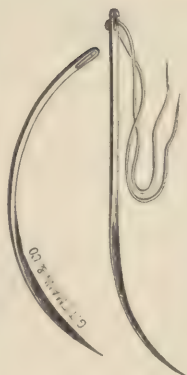


FIG. 2717.—Angular Pile Needle.

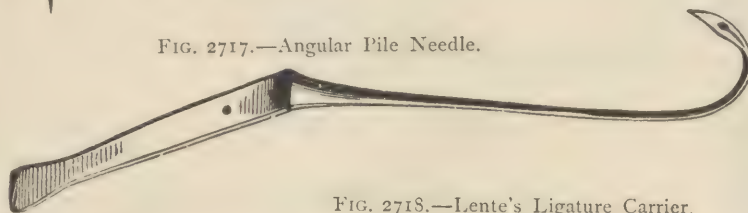


FIG. 2718.—Lente's Ligature Carrier.



FIG. 2719.—Hutchinson's Needle, for the Subcutaneous Ligation of External Hæmorrhoidal Tumors.



FIG. 2720.—Slide-Catch Artery and Needle Forceps.



FIG. 2721.—Carroll's Knot Tier.

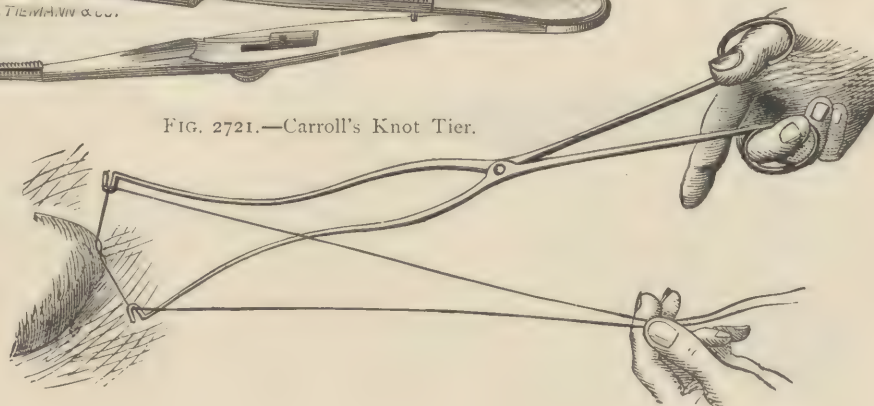


FIG. 2716.—Helical Needle for Piles, Ruptured Perineum, and for Colotomy.



FIG. 2713.—Bush's Pile Needles and Holder.



FIG. 2714.—Suture Needles.



FIG. 2722.—Skeene's Needle for Ruptured Perineum.



ENLARGED VIEW.

ANAL AND RECTAL.

HÆMORRHOIDAL.

FIG. 2723.—Verona's Winch,
for Ligating Hæmorrhoidal Tumors.

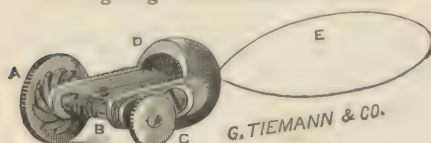


FIG. 2724.—Bodenhamer's Curvilinear Forceps,
for Facilitating the Ligation of Hæmorrhoidal Tumors.

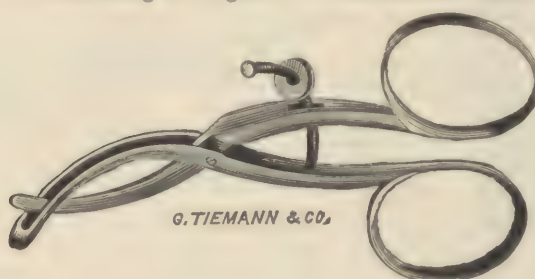


FIG. 2725.—Gibson's Instrument for the Introduction
of the Ligature in Anal Fistula.

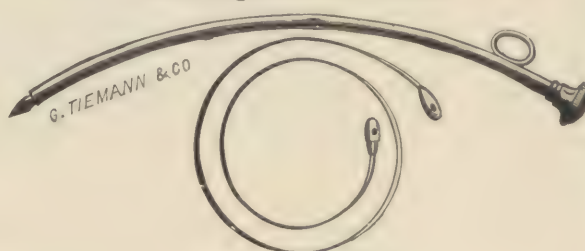


FIG. 2728.—Van Buren's Ligator.

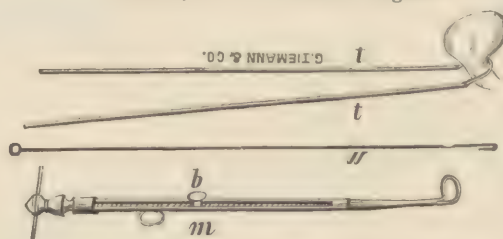


FIG. 2729.—Pin for Transfixing Hæmorrhoidal Tumors.



FIG. 2730.—Allingham's Ligature Carrier.



FIG. 2726.—Rectal Porte Meche and Tampon.



FIG. 2727.—Bodenhamer's Spring Forceps, for Seizing and Ligating Bleeding Vessels,
as well as Polypoid Tumors of the Rectum when high up.

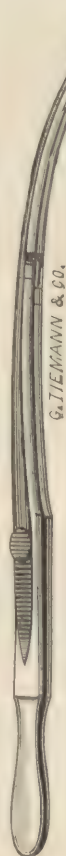
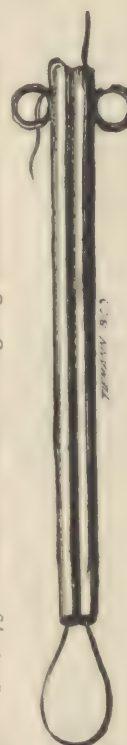


FIG. 2731.—Gooch's Canula for Ligating Hæmorrhoidal Tumors.



For facilitating the introduction of the elastic ligature. A double ligature can be readily drawn through a fistula or under a tumor. It is not necessary, in fistula, to see the hook, for if the finger with a loop of india rubber around it be passed up the rectum, the loop can, with great facility, be directed over the end of the probe and caught in the notch, quite unassisted by vision. *C* shows the sharp-pointed instrument adapted to the canula, so that only one handle and one canula are required to complete the double instrument. Many other simple surgical operations may be advantageously performed by means of the elastic ligature.

DITTEL'S ELASTIC LIGATURE (1 yard long, 25 cents) exerts a constant and almost painless constriction upon the parts ligated with it.

See also "ECRASEURS," "HELMUTH'S LIGATURE CARRIER," page 92.

ANAL AND RECTAL.

HÆMORRHOIDAL.

FIG. 2734.—Smith's Pile Clamp.

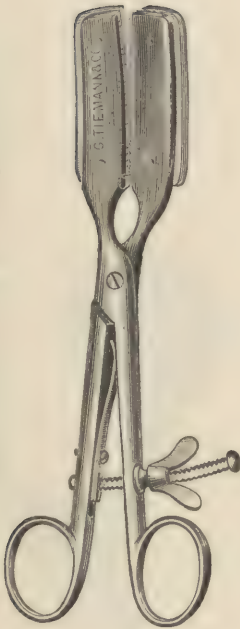


FIG. 2732.—Smith's Serrated and Cutting Cauteries.

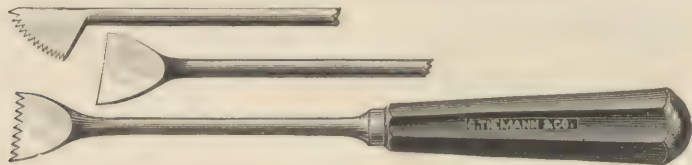


FIG. 2733.—Kelsey's Pile Clamp.



FIG. 2735.—Tiemann's Hæmorrhoidal Clamp, Ivory Plated.



FIG. 2736.—Luer's Polypus Forceps.

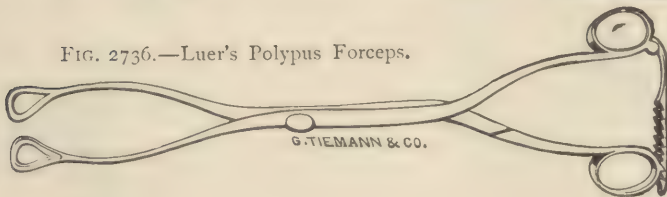


FIG. 2737.—Ashton's Pile Clamp.

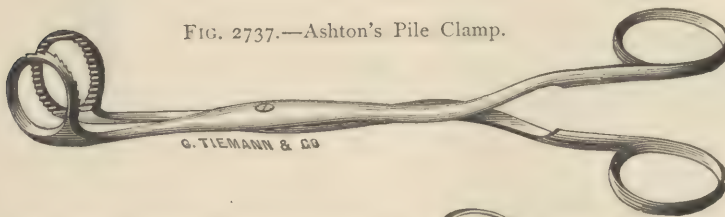


FIG. 2738.—Kelsey's Tumor Forceps.

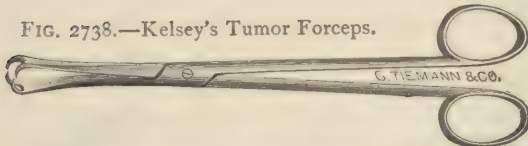


FIG. 2739.—Smith's Wire Ecraseur.

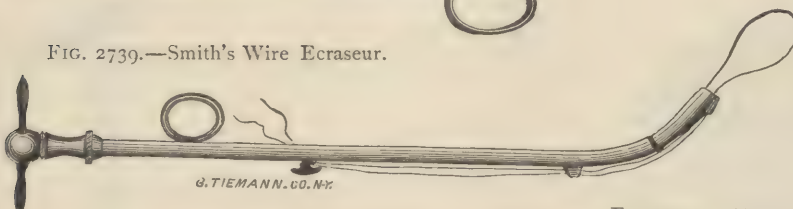


FIG. 2740.—Amussat's Hæmorrhoidal Clamp and Cautery combined.

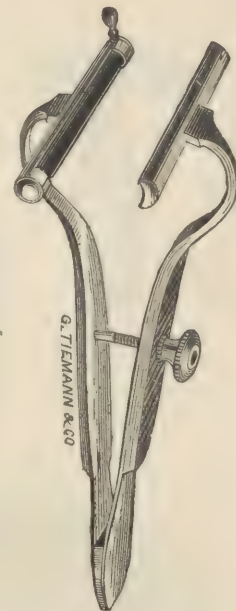


FIG. 2741.—Siemon's Sharp Scoop, for Removing Soft Growths.



"For removing pieces of cancerous mass, after performing double proctotomy."—"Diseases of the Rectum and Anus." Kelsey, page 362. 1884.

See "KELSEY'S PROCTOTOMY KNIFE," Fig. 2681.

ANAL AND RECTAL.

HÆMORRHOIDAL.

FIG. 2742.—Set of three Cautery Irons, to fit one handle.



See "ACTUAL
CAUTERY IRONS AND
BLOW-PIPE," p. 39.

FIG. 2743.—Rectal Cauteries
(*en roseau, en haricot*).



Pile Bougies and Supporters.

FIG. 2749.—Prolapsis Ani and Pile Supporter.

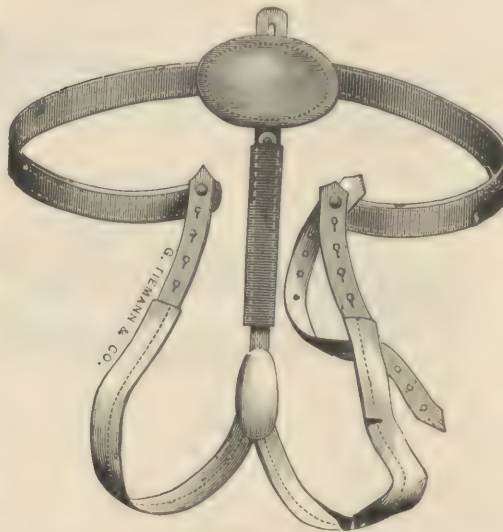


FIG. 2750.—Matthieu's Prolapsus Ani Supporter.

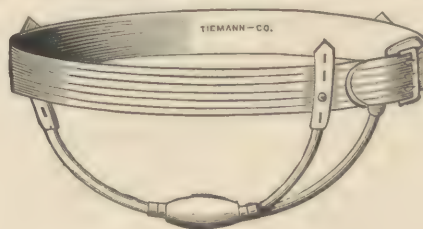


FIG. 2744.—Swift's Pile Bougie.



FIG. 2746.—Trosseau's Pile Supporter,
and for treating Spermatorrhœa.



FIG. 2745.—Pile Bougie and
Prolapsus Ani Supporter.



FIG. 2747.—Bolton's Pile Bougie.

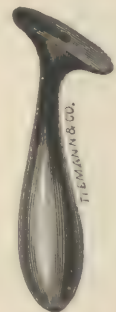
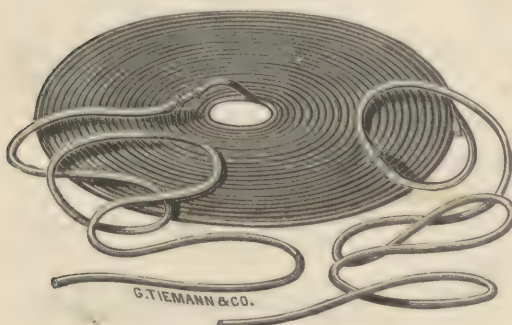


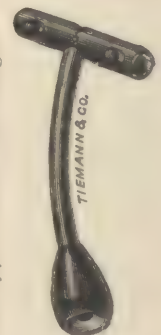
FIG. 2751.—Abdominal Pad, for Application of
Heat or Cold.



See pages 40 and 41,
"DRY COLD AND HEAT."

This appliance is most efficacious
in subduing inflammation and lower-
ing fever. It is especially useful in
peritonitis following operations with-
in the abdominal cavity.

FIG. 2748.—Reed's Pile Bougie.



ANAL AND RECTAL.

HÆMORRHOIDAL.

Stillman's Method for the Radical Cure of Hæmorrhoids without an Operation.

"Among the most numerous cases requiring surgical treatment which come before the practitioner are those suffering from piles, and for these, especially when of long standing and accompanied by more or less prolapse of the rectum, surgery offers us many means of relief: extirpation by the knife, ligature or galvano-cautery, absorption by hypodermic injections, &c. But it seems to me that the main point of treatment—absorption by support and pressure—is overlooked; and this is especially adapted to cure forty cases out of fifty, as the disease is caused by a relaxation of the parts about the anus, due to prolonged constipation, to irregular and prolonged defecation, and any other condition which admits of a filled and heavy rectum bearing down too strongly upon its supports.

"Of course, the less advanced cases can be treated by regulating the bowels with a tonic laxative; the occasional use of a T bandage, when unusual exercise is expected; insisting upon a regular time for defecation; the use of astringent injections, &c., varying for each case. But when the patient exhibits piles of sufficient extent to be out more or less most of the time, and attended or not with prolapse or hæmorrhage, the method of procedure I am about to detail will be found especially useful.

"Place your patient in the knee-chest position, and, after anointing the parts with some lubricator, gently exercise traction, as in a hernia reduction, and the force of the atmospheric pressure will cause the piles to return. Follow them with your finger until each pile is in place. This reduction cannot be effected in severe cases unless the patient is placed in this position, and all cases of piles should be reduced in this manner.

"So much for the method of reduction, for which I was indebted, during my hospital work, to Dr. Joseph W. Howe.

"But, in practice, I found that the moment the patient assumed an erect position, the piles came down, because of the lack of support, and in looking about to find something which would supply the deficiency, the supporters shown in the engravings (Figs. 2744 and 2747) were brought to my notice. They are manufactured by Geo. Tiemann & Co., of rubber, semi-solid and very flexible, and of the correct shape for introduction and retention in the rectum.

"Having been well lubricated, they are passed into the rectum on the withdrawal of the finger, and kept in place there by a T bandage and compress. One napkin is passed around the waist and the two ends fastened with a safety-pin, and a second napkin having a folded one fastened to its centre for a compress over the anus, is passed between the legs and secured to the other napkin in front and behind with safety-pins, being drawn up as tightly as is consistent with the comfort of the patient.

"The support produced by the combination of the rubber pessary and the T bandage is both external and internal, producing rapid absorption and cure without pain, and affords great relief to the patient.

"I usually place a mirror at such an angle that the patient can see the whole procedure, and I have yet to find one that cannot practice it upon himself, as he is directed to do each morning on rising, each night on retiring, and after each defecation, although in most cases the latter only will be necessary. Combine with this the use of a laxative pill."—*Medical Record*, February, 14, 1880. Chas. F. Stillman, M.D.

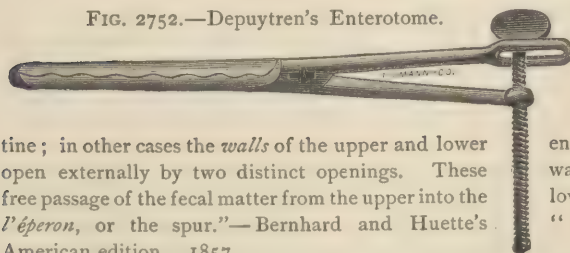
ARTIFICIAL ANUS.

"If (in gunshot wounds) the wounded intestine becomes attached to the external wound, an *artificial anus* is formed, and the contents of the bowels are discharged externally at this opening."—"Operative Surgery." Stephen Smith.

"One of the various accidents which are liable to result from a strangulated hernia is that it may terminate in gangrene of the intestine, producing ulceration of the tumor, and giving passage externally to fecal matters through a fistulous opening in the groin. This opening, becoming permanent, and permitting constantly the passage of the fecal matter, forms the variety of disease to which the name of *artificial anus* has been given."

Cure of Artificial Anus.

FIG. 2752.—Depuytren's Enterotome.



time; in other cases the *walls* of the upper and lower open externally by two distinct openings. These free passage of the fecal matter from the upper into the *l'éperon*, or the spur."—Bernhard and Huette's American edition. 1857.

"To restore the passage by the removal of the septum, or the two opposed walls of the intestine: If the septum is prominent and unyielding, it must be destroyed by the enterotome, an instrument with serrated edges (Fig. 2752), worked by a screw. Place the patient on the back, and distinguish the upper and lower end of the bowel; now

"The condition of the intestine, both above and below the opening, should be thoroughly ascertained, for upon it the curability of the disease depends. Sometimes the artificial anus consists of a number of small external openings, at a variable distance from the intestine of the gut lie in contact and parallel to each other, and walls form a species of valvular system, which prevents the lower end of the gut. This septum is called by the French "Manual of Operative Surgery." Van Buren & Isaacs'

ANAL AND RECTAL.

ARTIFICIAL ANUS.

Cure of Artificial Anus. (Continued.)

take one branch of the enterotome in the right hand and pass it carefully along the track of the bowel one to three inches, according to the depth of the septum; while an assistant retains the branch, introduce the other with the same care along the other bowel; now join the blades and tighten them sufficiently to compress the opposed serous surfaces firmly together, and finally to destroy the septum by strangulation; after a few days the instrument becomes loose and finally falls. The after treatment requires compress and truss until the wound heals."—"Operative Surgery." Stephen Smith.

Creation of Artificial Anus.

"The *creation of artificial anus* constitutes a regular operation, by which the surgeon proposes to make an orifice in the intestine and in the corresponding portion of the abdominal wall, through which the feces can escape, when, in certain pathological conditions, their passage by the natural anus is prevented.

"According to Amussat the following conditions may require the performance of the operation: 1. Accumulation of feces in consequence of an obstruction of the rectum, or any other portion of the large intestine, when the obstacle cannot be removed through the natural passage below, and life is thereby in danger; 2. For cancerous diseases of the rectum and large intestine, when they occasion difficulty in defecation; 3. When the rectum is congenitally imperforate, or rather when a portion of this intestine is wanting, and the passage cannot be established from below.

"There are but two methods now adopted by surgeons. The first is *Littre's* (1710), who, having seen an obliteration of the rectum in a child who died on the sixth day, pointed out the possibility of making an artificial anus through the abdominal parietes and the sigmoid flexure of the colon. The second method was proposed by *Callisen*, of Copenhagen, and consists in making an opening in the descending colon in the lumbar region. *Callisen's* operation was, however, rejected by the great majority of surgeons. In 1839 *Amussat* directed attention to its feasibility, and proposed a modification."—Bernhard and Huetten.

"*Amussat's Operation*.—The instrumental apparatus consists of straight and convex bistouries, scissors, ligature forceps, ligatures and suture needles.

"The operation, which ought to be preferred in the adult, is that first made by *Amussat* in 1839, and which has today been repeated many times with what has been regarded as encouraging success. The following is his method: A transverse incision is made upon the left side parallel to, and about two finger's breadth above the crest of the ileum, and four inches in length, the centre of which will correspond to the centre of the crest. Continuing to divide the tissues in this direction, portions of the fibres of the latissimus dorsi, quadratus lumborum, obliquus externus and internus, and the transversalis will be successively exposed and cut; or the line of the incision may be kept to the outer side of the quadratus lumborum, so that its sheath only will be exposed, and its muscular fibres not cut. Cellulo-adipose tissue of more or less abundance will now be brought into view, beneath which lies the colon; which last may be recognized by its hardness and by its bulging, if filled with feces, and by its greenish color. The intestine being well exposed, is seized by a tenaculum or with a strong ligature, and held until it is opened by a knife or large trocar and canula. If the wound is deep care must be taken in emptying the gut that its contents do not escape among the adjacent tissues, or along the track of the wound. The operation is now completed by stitching the margins of the intestinal wound to the integument, and for this purpose it must be drawn well out. After the operation the patient should repose upon the wounded side, to facilitate the escape of the contents of the bowels. If it is desired to render the canal fistulous and permanent, a large silver, ivory or flexible tube may be subsequently introduced, furnished with a shield to prevent its escape inwards, and a stop-cock to control the fecal evacuations, or the open mouth of the tube may be kept closed with cork or india rubber pad, supported by a bandage.

"In operating upon infants with congenital occlusion of the rectum, it will be remembered that the kidneys are, at this period of life, large, and extend outwards to near the line of incision; that they are covered with very little fat, and that the meso-colon descends lower upon the colon than in adult life. Some have, for these and other reasons, preferred in such cases *Littre's operation*, which consists in cutting from the left iliac region directly through the peritoneum and upon the sigmoid flexure. This method was adopted by Dr. Pooley. The operation was completely successful, and at the end of a year the child was in good health."—Pooley. *American Journal of Obstetrics, &c.*, May, 1870.

"The vessels liable to be cut in this operation, whether made according to *Amussat's* or *Littre's* method, are small, and will be easily secured by the forceps and ligature.

"It seems necessary to state further, in regard to the operation of colotomy, in whatever manner performed, that although nearly one-half of the patients upon whom it is made have survived a sufficient length of time to render it certain that it is a proper surgical expedient, where the purpose is solely to prolong life, yet it cannot be denied that it seldom, if ever, results in a permanent cure by the restoration of the natural or original channel."—"The Principles and Practice of Surgery." H. A. Hamilton. 1872.

HERNIA.

ABDOMINAL HERNIÆ.

"*Abdominal herniæ* are remarkable for their frequency, variety and the danger attending them. They are produced by the protrusion of the viscera contained in the abdomen through the natural or accidental apertures in the parietes of that cavity. The organs which form them most frequently are the intestines and the epiploon. These herniæ have been divided, according to the apertures by which they escape, into:

"1. *Inguinal* or *suprapubic hernia*. These issue by the inguinal canal: they are called *bubonocoele* when small, and *scrotal hernia* or *orchocele*, in man, when they descend into the scrotum: *vulvar hernia*, *puental* or *labial hernia*, *epiöcele*, in woman, when they extend to the labia majora. *Direct inguinal hernia*, *ventro inguinal hernia*, when the protruding parts, in place of entering the internal ring and descending along the inguinal canal, make a direct passage through the parietes of the abdomen opposite the external ring.

"2. *Crural* or *femoral hernia*, *merocoele*, when they issue by the crural canal.

"3. *Infra pubian* or *sub-pubic hernia*, *öödeocoele*, *opeocoele*, *opodeocoele*, *hernia foraminis ovalis seu obturatoria*, when the viscera escape through the opening, which gives passage to the infra pubian vessels.

"4. *Ischiatic* or *sciatic hernia*, when it takes place through the sacro-sciatic notch.

"5. *Umbilical hernia*, *hernia umbilicalis*, *exomphalos*, *omphalocoele*, when it occurs at the umbilicus or near it.

"6. *Epigastric hernia*, occurring through the linea alba above the umbilicus.

"7. *Hypogastric* or *infra-umbilical hernia*, *cæliocoele*, *hypogastrocœle*, when it occurs through the linea alba below the umbilicus.

"8. *Perineal hernia*, *mesocœlocœle*, *hernia perinæi seu perinealis*, *perinæocœle*, *perineocœle*, when it takes place through the levator ani and appears at the perineum.

"9. *Vaginal hernia*, *colpocœle*, *colecœle*, *seu elytrocœle*, through the parietes of the vagina.

"10. *Diaphragmatic hernia*, *diaphragmatocœle*, when it passes through the diaphragm.

"The prolongation of the hernial sac in various directions within the abdominal walls is called *intraparietal* or *intramuscular hernia*. *Herniæ* are likewise distinguished, according to the viscera forming them, into *enterocœle*, *epiplocœle*, *entero-epiplocœle*, *gastrocœle*, *cystocœle*, *hepatocœle*, *splenocœle*, &c.

"When a hernia can be restored to its natural cavity, by the aid of pressure, &c., properly applied, it is said to be *reducible*. It is, on the contrary, *irreducible* when adhesion, bulk, &c., oppose its return. When the aperture which has given passage to the hernia occasions more or less constriction of the protruded portion, the hernia is said to be *incarcerated*, *hernia obstructa*—or *strangulated*, *hernia strangulata*; and, if the constriction be not removed, constipation, hiccough, vomiting, and all signs of inflammation, followed by gangrene, supervene, with alterations of the features, small pulse, cold extremities, and death."

The Treatment of Herniæ.

"The therapeutical indications are: 1. *As regards reducible hernia*—to replace the viscera in the abdomen by the taxis, and to retain them there by the use of a *truss*, which, if properly adapted, may effect a radical cure; 2. *As regards irreducible hernia*—to support the tumor by an appropriate suspensory bandage; 3. *As regards strangulated hernia*—to have recourse to the taxis, bloodletting, warm bath, tobacco clysters, ice to the tumor, and, if these should not succeed, to perform an operation, which consists in dividing the covering of the hernia and cutting the aponeurotic ring, which causes the strangulation; reducing the displaced viscera, unless their diseased condition should require them to be retained without; dressing the wound appropriately; restoring the course of the fæces by means of gentle clysters; preventing or combating inflammation of the abdominal viscera; conducting the wound to cicatrization by appropriate means, and afterwards supporting the cicatrix by a bandage."—DUNGLISON.

Radical Cure of Herniæ.

"By the application of trusses which maintain for a considerable time a thorough reduction of herniæ, a permanent cure is occasionally effected; especially may this happen in cases of oblique inguinal herniæ. If a hernia is reduced immediately, or very soon after its occurrence, the sac itself will often be found to be replaced, and there are many chances that if a truss is applied at once and kept in place steadily, the hernia will never again descend. The same is true of the congenital herniæ of infants; for, although we do not in these cases return the sac, a few weeks of retention is often, indeed generally, sufficient to secure an obliteration of the canal. There is, however, a large class of old herniæ in which nothing can be expected from a truss, except to maintain their reduction while the instrument is applied."—"The Principles and Practice of Surgery." Hamilton.

"The radical cure of hernia would be too important a triumph for surgery and a resource too deeply interesting to humanity to permit that we should not endeavor to improve it still more and to modify its processes and to make renewed efforts for the purpose of attaining this result. For myself I cannot cease to entertain the idea that in the experimental spirit of our age we may succeed in obtaining a remedy of this description which shall be of real efficacy."—"Operative Surgery." Velpeau.

HERNIAL.

HERNIOTOMY.

For the Relief of Strangulated Hernia.

FIG. 2753.—Peter's Hernia Director.

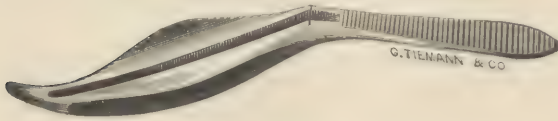


FIG. 2754.—Hunter's Director.

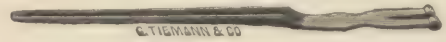


FIG. 2755.—Hernia Director.

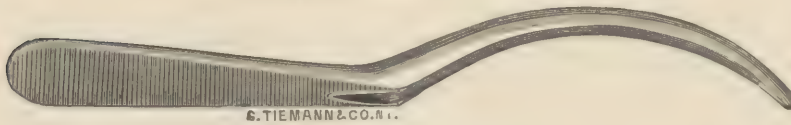


FIG. 2756.—Hinge Hernia Director.

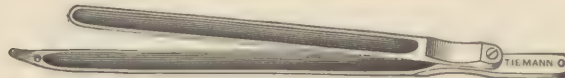


FIG. 2757.—Levis' Hernia Director.



FIG. 2758.—Cooper's Hernia Knife.

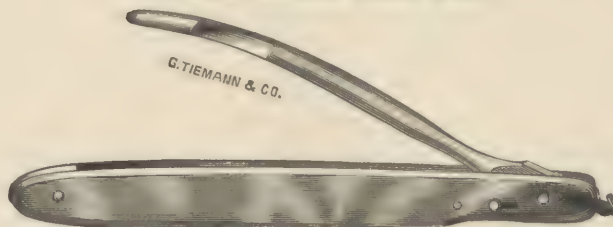


FIG. 2759.—Stewart's Hernia Knife.



FIG. 2760.—Warren's Herniotome.



FIG. 2761.—Wales' Herniotome and Rectotome.



FIG. 2762.—Allis' Herniotome.



FIG. 2763.—Hernia Saw.



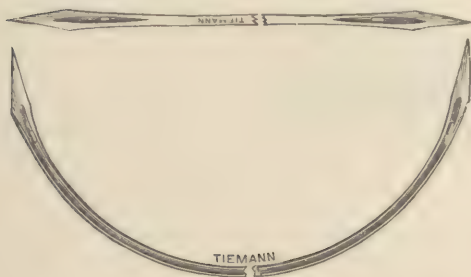
"The operation only requires the cutting or severing of a few fibres of Poupart's ligament, and it is astonishing how very small an amount of this ligament, on becoming divided, will release a strangulated sac or intestine, so as to be readily reduced into the abdominal cavity. But bear in mind, while dividing the ligament, to cut as little as possible, for too much cutting here leaves our patient in a much worse condition for the descent of his rupture than before strangulation, and more liable to become again strangulated by a too free division of these ligaments."—"Practical Treatise on Hernia." J. H. Warren, M. D.

HERNIAL.

FOR THE RADICAL CURE OPERATIONS.

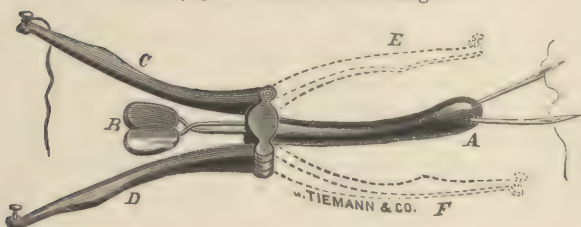
The methods employed to accomplish this by plugging the mouth of the sac with its invaginated fundus and securing it to the surrounding tissues by sutures, and to produce such an inflammation of the parts as will provoke adhesions, and hence closure or contraction of the enlarged opening.

FIG. 2764.—Dowell's Hernia Needles.



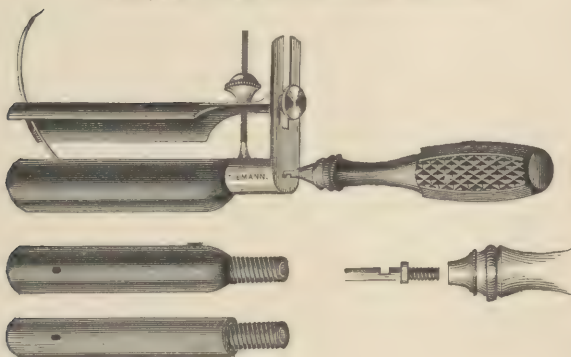
Dowell's operation.—The double spear-pointed needle being threaded with silver wire at one end, a portion of the skin and cellular tissue is pinched up over the hernia and the needle inserted and pulled through until the threaded point reaches the superior tendon of the external ring. The sac is now invaginated and the needle passed through both superior and inferior tendons of the ring. A second ligature is applied in the same way, and both tied over a piece of cork, drawing the edges of the two tendons together.

FIG. 2765.—White's Hernia Ligator.



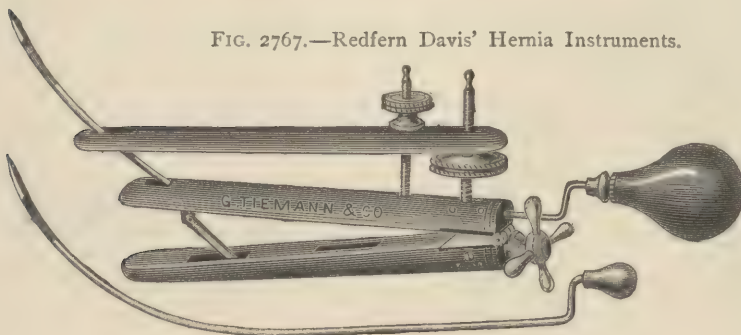
Octavius White's method, by ligature.—The point, *A*, is invaginated into the ring. The needles are then pushed out through the integument and a ligature tied over the two handles and knobs, *C* and *D*, these handles being turned over, as shown by the dotted lines. The needles are then withdrawn and the instrument, weighing less than an ounce, is left in place for some days.

FIG. 2766.—Wutzer's Hernia Instruments.



Wutzer's instrument consists of three pieces, a cylinder, a needle, and a cover to produce adhesions. The cylinder is a hollow oval, and its end is nicely rounded. A curved needle runs through the cylinder, emerging a short distance from the rounded point. The hernia having been returned, the integument is pushed up the canal with the forefinger of the left hand, the cylinder is introduced into the cul-de-sac thus made, the finger at the same time being withdrawn. When the end of the cylinder is in the internal ring, the cover is made to compress the integument; the needle is then pushed through the sac, canal and integument. The handle is then unscrewed and the rest of the instrument is allowed to remain in position for six or eight days. The puncture made by the needle suppurates by the fourth day; the bowels are not allowed to move, rest is enforced, with a plain diet, and then a truss is worn for six months or more.

FIG. 2767.—Redfern Davis' Hernia Instruments.



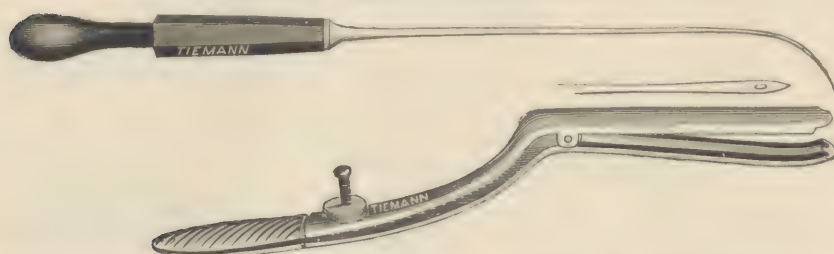
"It is proper to say of these operations, that, by their most earnest advocates, they have been considered applicable especially to the smallest, most recent and least troublesome herniæ, and their value has been denied or seriously questioned in all those large, ancient and inveterate cases which alone demand resources beyond what the truss, skillfully applied, can supply."—"Principles and Practice of Surgery." Hamilton.

HERNIAL.

FOR THE RADICAL CURE OPERATIONS.

"For plugging up the orifice with the surrounding tissues and securing them by suture, to produce such an inflammation of the parts as will provoke adhesions of the enlarged opening, &c.

FIG. 2768.—Agnew's Hernia Instruments.



connected by a hinge near the handle, which is itself controlled by a screw; secondly, of a very long, slender needle, mounted upon a wooden handle, and terminating in a curved point, pierced by an orifice; and, thirdly, of a common stout suture needle, two inches and a half in length. The parts being well shaved, and a portion of the scrotal integument pushed into the ring, the instrument, with its grooved blade looking towards the abdomen, is employed to carry, by gentle but steady pressure, the invaginated plug to the upper extremity of the inguinal canal. Holding the parts in these relations, the surgeon inserts the point of the long needle, armed with a silver wire, into one of the canals of the inner blade, widely separated from the other, and, passing it on, perforates the superimposed structures. The needle being withdrawn, is then carried along the other gutter, and thence, in like manner, across the tissues, the two punctures being about half an inch apart. In this way the base of the plug is thoroughly embraced by the loop of the wire, the ends of which are next twisted over a roll of lint upon the surface of the abdomen. The instrument being kept steady in position, the sides of the inguinal canal are next approximated by three horizontal sutures, about half an inch apart, the needle, armed with a stout silk thread, being passed between the blades of the cylinder. In this way all danger of including the spermatic cord and the peritoneum is effectually avoided."—"System of Surgery," Gross, 1882.

FIG. 2769.—Span-
ton's Strephtome.



"I have now a record of over sixty cases, all of whom have recovered. The patients varied in age from five months to thirty-four years, and the herniæ differed in size from small tense ones to enormous lax ones. All were of the inguinal kind, some oblique, others direct, and a considerable proportion were congenital. An incision is made, large enough to admit the forefinger, through the skin of the scrotum at the fundus of the hernial sac, an inch and a half or two inches below the pubic spine. The sac, with the fascial tissue covering it, is then separated from the skin by passing the knife or the handle freely around the internal surface of the wound, until a sufficient extent has been separated to permit the finger easily to invaginate the sac into the hernial canal, which is readily accomplished by pushing the sac with the left forefinger up into the internal ring. After carefully examining the condition of the parts within reach of his finger, especially with regard to the position of the blood-vessels and the boundaries of the aperture, the operator retains his forefinger in the inguinal canal, thereby protecting the spermatic cord, which lies below his finger, and at the same time closing the internal ring so as to prevent any protrusion of the bowel. Sometimes, with a very potent ring, it is necessary for an assistant to place his finger externally on the groin to make perfectly sure of this, especially if there is any cough or struggling. It is, however, wiser to wait a few moments and to let the patient become quiescent before proceeding further. Then, holding the strephotome firmly in the right hand, the surgeon thrusts the point through the skin of the groin at that part of the surface which corresponds to the outer pillar of the internal ring, which is also pierced by the point which now comes in contact with the left forefinger. Having given the screw a turn, the point is made to pierce the invaginated sac, and pushed on through the internal pillar (conjointed tendon) as high up as can be safely reached, the left forefinger carefully guarding the point of the instrument throughout. Another turn is now made, causing the screw to pass through the invaginated tissues and across the pillars of the external ring as many times as the length of the canal and the nature of the case will permit. The left finger is gradually withdrawn as the point passes downward and outward through the opening in the scrotum, the spermatic cord lying behind, and slightly compressed by the gradual tightening of the hernial canal. The point of the screw is then protected by a small india rubber ball, and the handle lies flat on the outer surface of the abdomen. The scrotal wound is closed by a single wire or hair suture. In from seven to ten days the screw can be removed, and a compress used to keep the parts in position."—"Annals of Anatomy and Surgery," by Dr. William Dunnet Spanton, of England. *Medical and Surgical Reporter*, Nov. 25, 1882. *British Medical Journal*, Dec. 11, 25, 1880, and Jan. 8, 1881.

"The operation of Wutzer has been materially simplified by Agnew. The apparatus required for its performance consists, first, of a steel instrument, closely resembling a bivalve speculum, the blades, of which one has two longitudinal grooves, being three inches in length and con-

HERNIAL.

FOR THE RADICAL CURE OPERATIONS.

The Heatonian Method.

"The pathology of it, according to the author, consists in developing, by the action of an irritant which is also an astringent, a tendinous irritation, causing a contraction of the fibrous tissues and rings which the circular arrangement of fibres makes possible, and the formation of a strongly plastic lymph. Recognizing that the fibrous structures and rings are primarily and principally in fault, to these alone is the remedy addressed. The mild character of the irritant, the operation being subcutaneous, the parts so slightly vascular being nourished by nutritive juices, are the reasons given for the irritation exceeding no further bounds, while the permanency of the effect produced is due to the interstitial and hyperplastic changes and the disposition of fibrous tissues generally to recover slowly—analogy being drawn to the duration of changes in similar structures elsewhere, as around joints and the heart valves.

"The irritant used is the fluid extract of *quercus alba* prepared in vacuo, to which is added the solid extract in the proportion of fourteen grains to half an ounce, and a little morphia to lessen pain; this is triturated with heat until a very perfect solution is obtained. The instrument with which the operation can be most satisfactorily done is De Garmo's syringe.

FIG. 2770.—Heaton's Hernia Syringe.



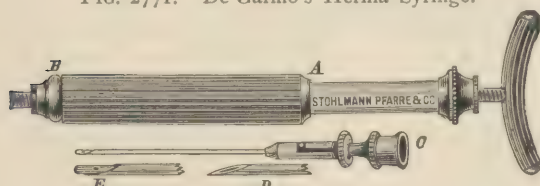
"The operation consists in locating the exact position of the external abdominal ring, by invaginating a finger of the right hand in the scrotum and fixing its position on the exterior by a finger of the other hand, which is made to press directly down upon it, or, if possible, in it. The instrument (Fig. 2771), already prepared, is carried with a sharp thrust quickly through the integument, just passing the external pillar; the needle, then guarded, is carried on into the canal, care being exercised not to injure the cord or penetrate into the peritoneal cavity. The position of the beak of the instrument should at this stage be confirmed by a finger again invaginated through the scrotum, and the irritant deposited as it is withdrawn, all the fibrous strictures being wet. A bandage and compress, previously applied, are then carefully adjusted into position, and so arranged as to press with considerable firmness downwards and upwards in the direction of the canal, with somewhat less pressure over the internal than the external ring. This procedure is not accompanied with much pain, and that which follows is of short duration and but moderate intensity. Tenderness exists in a degree for some little time, but not enough to require the compress to be removed or to produce any inconvenience.

"The recumbent position for a week or so, and no movement from the bowels, are to be insisted on, for the protrusion must not be allowed to descend after its reduction and the irritant deposited. The bandage, or a light truss, should be worn for a month or more, as a precaution, but after that it may be discontinued and the case considered cured. In a certain number of cases the operation has to be repeated, more especially where the apertures are large and patulous or the cause has been violent tearing of the fibrous rings, and in congested hernia where they apparently are deficient in fibrous structure.

"Simple as all this appears, it requires considerable care and dexterity; the cord, which must be pushed aside, may be displaced in part and overlie the sac which may itself be irreducible. The direction of the canal and position of the internal ring being changed, the possibility of transfixing one of the pillars, wounding the cord or entering the abdominal cavity, are all to be remembered and avoided. The attention to every detail in operating, adjusting the compress and bandage, and the after care, are so important as to largely determine the result in most cases. An hour or so, therefore, in the dissecting room, with a long needle, would not be misspent, but would aid to familiarize a beginner with the points most important to find, or as far as possible to avoid."—W. S. Heath, M.D., Assistant Surgeon U. S. Marine Hospital Service. *Buffalo Medical and Surgical Journal*, April, 1881.

"Having experienced some difficulties in the use of Dr. Heaton's syringe, and especially in being unable to deposit the irritant gradually, owing to the unsteady action of the piston of the syringe, I had constructed by Messrs. Stohlmann, Pfarre & Co. one similar to that shown in the cut (Fig. 2771).

FIG. 2771.—De Garmo's Hernia Syringe.



"My first modification was in the addition of a screw piston, with a crescent-shaped bar at the end of the same, and in having the exterior of the barrel furrowed, A to B, instead of smooth.

"In order, however, to deprive the operation of its only remaining dangers, I have added the trocar needle shown in the cut, C. The principle involved in the construction of this needle is the design of Dr. Simon

HERNIAL.

FOR THE RADICAL CURE OPERATIONS.

The Heatonian Method. (Continued).

Fitch, who first introduced it as the 'dome trocar.' *D* represents the cutting point of the needle exposed; *E* shows it with the point protected in such a manner that no injury can be done to the canal or vessels.

"The hernial syringe is used in the following manner: It should be charged by removing the needle from the barrel and filling the latter two-thirds full; the central part of the needle is then replaced; then, with beak elevated, sufficient of the irritant should be ejected to leave the barrel about half full. By this means all air is expelled and the perfect action of the syringe is secured. The sheath is now slipped on and it is ready for use. After penetrating the tissues with the cutting point of the sheath, it is drawn back so that it is perfectly protected, and the beak is then carried well into the canal without fear of injury to its tissue or to the vessels and nerves which are in close proximity to it. The crescent of the piston is now held firmly in the palm of the hand, and the barrel of the syringe is revolved between the thumb and finger of the same hand. In this manner the needle is revolved and at the same time is gradually withdrawn, thereby traversing the entire length of the canal and distributing the irritant over its interior surface. The after treatment corresponds in every particular with that given by Dr. Heaton."—W. B. De Garmo, M.D. *Medical Record*, February 7, 1880.

The irritant used is composed of

R.	Ext. quercus alba,	gr. xxviii.
	Ext. quercus alba,	℥. $\frac{2}{3}$ i.
M.	Morphia sulphas,	gr. i.

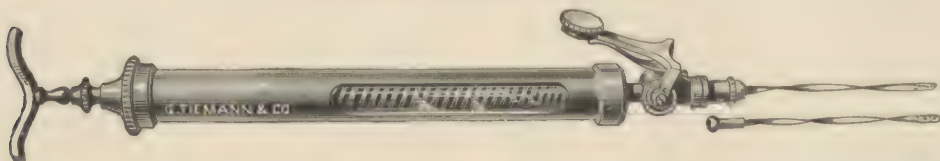
FIG. 2772.—Warren's Hernia Syringe, No. 1.



"The needles are flatish, oval in shape and twisted throughout their entire length. They are of three sizes. No. 1 is twisted to revolve once in penetrating one-fourth of an inch; No. 2, once every half inch; No. 3, once in penetrating three-fourths of an inch. I use No. 1 in operations on umbilical hernia and other herniæ where the tissues are thin. It is, therefore, small, and has a quick twist, because it is necessary that the needle in penetrating should make a full revolution, so as to distribute the fluid on the parts to be irritated by the injection. No. 2 is for use in operating on the majority of small and recent herniæ. No. 3 is for use on large and long-standing ruptures, where the needle must traverse tissue generally much thicker than in the other cases mentioned and often surrounded by adipose deposit.

"The method of using the instrument is as follows: With the valve, *G*, closed, the needle is inserted in the fluid to be used. The valve is now opened by slight pressure on the spring, *C*. The pressure being continued, the piston can be retracted and the barrel will be consequently filled with the fluid. The valve is then allowed to close and the instrument is charged for use. We now thrust the needle slowly and gently, but at the same time firmly, through the integuments. During this act the needle revolves because of its twisted form. As soon as it has passed through the integuments, pressure is made upon the spring, *C*, which opens the valve, *G*, and allows the fluid in the barrel to flow as slowly and in such quantity as the operator may in any given case think necessary."—Joseph H. Warren, M.D. *Medical Record*, January 10, 1880.

FIG. 2773.—Warren's Hernia Syringe, No. 2.



The No. 2 syringe (Fig. 2773) is equally effective as No. 1, and not as expensive. It has a valve by which we can control the fluid; the head of the needle revolves upon a ruby, and a spiral spring upon the piston within the barrel forces the plunger down upon the fluid, ejecting it through the valve. A screw on the piston, similar to that seen on the common hypodermic syringe, regulates, with great certainty, the number of drops of fluid we wish to use. It is more fully under control of the operator than the previous instrument.

HERNIA.

TAXIS. REDUCTION OF HERNIA.

"Taxis.—The name of taxis is given to the various manœuvres by which surgeons effect the return of the protruded organs into the abdomen. Taxis is performed by means of the hands applied directly upon the tumor.

"Position of the patient.—This should be such that the abdominal muscles will be in a state of complete relaxation. The patient should lie upon his back, with the head and shoulders slightly raised by means of pillows. The pelvis should also be elevated, so that the back will be in the most depending position and the tumor somewhat raised as regards the abdominal cavity. The patient lying in this position, no pressure will be made by the intestine upon the ring through which the hernia is expected to pass. The thighs should then be flexed upon the pelvis and the legs flexed upon the thighs.

"General rules.—Before describing the special manœuvres required for the reduction of either variety of hernia, we will quote from Malgaigne the following general rules which are applicable to the great majority of cases: 1st. Evacuate the bladder, to augment as much as possible the capacity of the belly. 2d. Advise the patient to breathe freely, without crying out or moving the head, in fact to keep as quiet as possible. 3d. Make but slight pressure at the commencement, in order that you may be able to increase it by degrees and continue it longer without bruising the hernia. 4th. Return first the parts that last protruded. 5th. Return them in the same direction as they came out: for instance, in recent inguinal hernia, push the intestine directly backward until the external ring is passed, then backward, upward, and especially outwards along the course of the canal, and lastly from before backward, when you have reason to think that you have reached the internal ring. In congenital and long standing hernia it usually suffices to push the parts backwards and slightly upwards to effect their reduction. 6th. Finally, in certain exceptional cases, these general rules fail, and the patients themselves have some peculiar method which they are in the habit of employing which it is advisable for the surgeon to adopt.

"Mode of operating.—The surgeon takes his position at the right of the patient, and embracing with one hand the base of the tumor, squeezes it gently with the other, with a view of distributing equally throughout the hernia the solid matter or gas which it may contain; this manœuvre, exercising a general pressure towards the abdominal ring, would force the whole of the hernial contents towards the point of strangulation, and thus render the reduction impossible, if the surgeon did not take care at the same time to compress the pedicle of the hernia in order to concentrate and contract the contents in them toward the ring; this last measure prevents the bearing down of the whole of the hernia at once upon the ring, but allows it to be drawn outwards and gradually forced along in the direction of the canal through which it is to pass. Compression may also be made upon the whole of the tumor, by applying the fingers over its entire surface. In some cases, those portions which lie next to the ring are returned in succession. To aid in the reduction, the patient may be requested not to breathe, that in this way the action of the diaphragm upon the intestinal mass may be prevented. The application of large cupping glasses upon the abdomen has also been recommended.

"It is very difficult, in an operation of this nature, for the surgeon to confine himself to one manœuvre exclusively. For the successful reduction of hernia, he should try, simultaneously or successively, the various methods which have been described by authors for this purpose. The essential point is, to return the hernia in the same direction which it took when coming out. During the performance of reduction the volume and hardness of the tumor may regularly diminish and then suddenly return into the abdomen; this sudden reduction, which is accompanied by a gurgling sound, is the sign of an intestinal hernia. Omental hernia usually returns gradually and without noise.

"Continuance of the taxis.—The taxis, when continued too long, may impair the chances of success of the operation by the knife, which is required after the failure of the various means which have been tried to effect reduction. Amussat, however, recommends the continuance of the taxis for a long time, and presents a number of successful cases in support of his opinion. This question should not absolutely be decided *a priori*. The surgeon, therefore, taking into consideration the various circumstances connected with the accident, must regulate his proceedings accordingly."—Bernard and Huet's "Manual of Operative Surgery. Van Buren and Isaac's American Edition. 1857.

TRUSSES. RETENTION OF HERNIA.

"A truss is an instrument employed for the purpose of preventing the descent of a hernia. Any truss that will keep up the hernia under all circumstances, and does not cause pain or lasting discomfort, is probably beneficial. Every truss that fails to carry out that object should be condemned. An instrument with too feeble a spring is a delusion and a snare; but one that is too powerful may tend to do more essential harm than present good by causing absorption of the abdominal parietes upon which it presses, and, as a consequence, enlargement of the opening through which the hernia descends. For the same reason a pad that is unduly convex is also to be condemned. A truss that will keep one hernia may fail in the case of another. Every hernia, in fact, requires a special adaptation of the pad as well as a carefully regulated spring. Every subject of hernia, young or old, male or female, should wear a truss, and in a good proportion of cases, particularly of the young, a cure may take place; that is, the neck of the sac may close. But even after a cure or apparent cure has taken place, it is well, for the sake of safety, to wear the instrument."—Bryant's "Practice of Surgery." Roberts. 1881.

HERNIAL.

TRUSSES.

Trusses for Inguinal and Femoral Hernia.

FIG. 2774.—French Truss. Single, Soft Pad, Right.

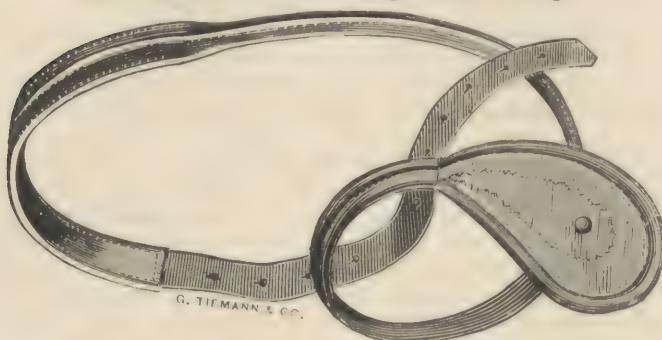


FIG. 2775.—French Adjustable Truss. Soft Pad, Right.



FIG. 2776.—German Truss. Soft Pad, Right.

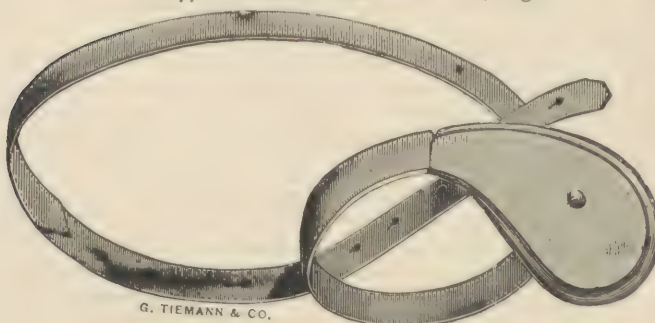
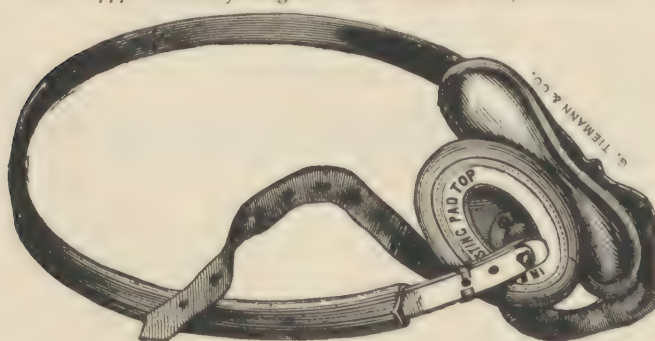


FIG. 2777.—Self-Adjusting or Ball and Socket Pad, either side.



"A retentive bandage or truss, properly applied, keeps the parts accurately and perfectly reduced, and thus prevents the occurrence of accidents which might complicate the hernia, such as unreducibility, obstruction, strangulation, &c. Trusses, also, when properly applied, may, under certain conditions regarding the age of the patient and the state of the disease, effect a radical cure of the hernia. It is therefore important that the surgeon should be thoroughly acquainted with their proper form and dimensions, in order to be able to use them with the greatest possible advantage.

"The trusses in use at the present time are such as are made of a narrow strip of well padded elastic steel, which is covered with leather and terminated by a pad, either fixed or movable, and of a shape which is varied to suit the case. Formerly soft bandages were used, made of leather, linen, or some other non-metallic substance. These bandages were fixed in their proper position by means of a belt made of some soft material, and the pressure required for keeping up the hernia was effected by means of a spring inserted into the pad.

"The pads of spring trusses may be more or less soft. They are sometimes made of wood, ivory, india rubber, &c. The union of the spring to the body of the truss is called the *neck*. Buttons are affixed to the plate to which the pad is attached, and are used to fasten the leather strap which extends beyond the steel spring carried around the body. Another strap, not illustrated on the figures, and not wanted in every case, made either of leather or cloth, may be looped to the posterior part of truss and brought from behind forward around the thigh, and attached to one of the buttons upon the pad plate. This last strap keeps the truss in place and prevents it from slipping up. There are also various kinds of trusses for double hernia. The requisites of a good truss are: that it be appropriate to size and contour of the patient; and that it maintains a moderate and continuous pressure upon the tendinous ring, without giving annoyance."

HERNIAL.

TRUSSES.

For Inguinal and Femoral Hernia.

FIG. 2778.—Bow Truss. Single, Wooden Pad, Right.

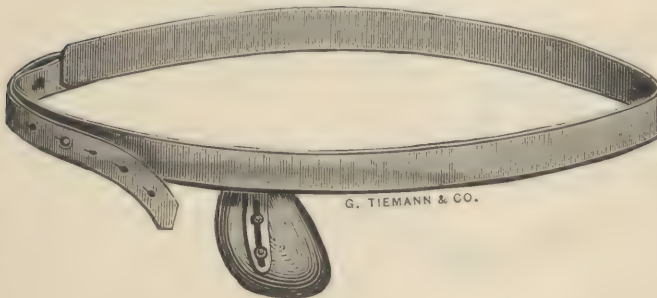


FIG. 2779.—Ratchet Truss. Hard or Soft Pad, either side.

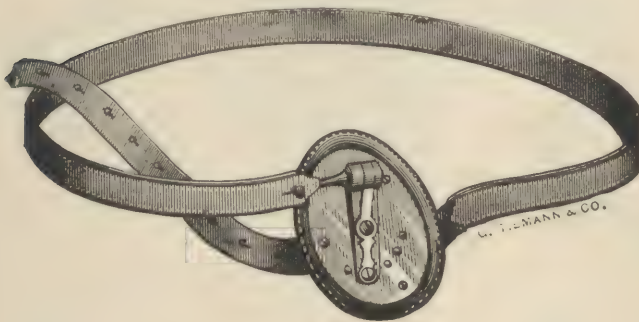


FIG. 2780.—Hull's Truss. Soft Pads, either side.

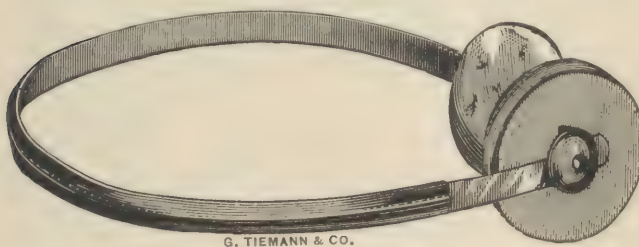
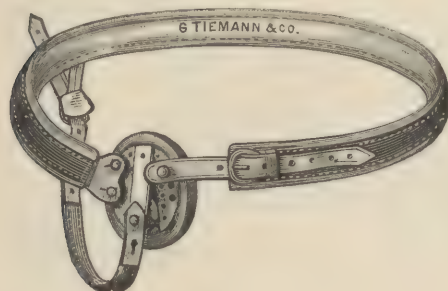


FIG. 2781.—Moc. Main Truss, for night wear.



Application of a Truss.

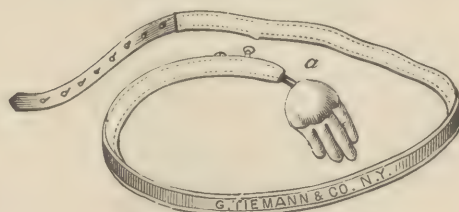
"The patient is laid down upon his back and the truss carried around the pelvis; then, after reducing the hernia, the surgeon keeps it in this condition by placing one hand over the inguinal or femoral ring, and now applying the pad directly over that point, he retains it in this position by buttoning the leather belt to the back of the pad; he then carries the other strap around the thigh and also fastens it to the back of the pad. The patient then rises, and, by walking about and making various movements of the limbs, enables the surgeon to see if the truss keeps the hernia firmly and properly in place.

"When a truss is applied to a femoral hernia, the pad should be carried below Poupart's ligament. Malgaigne thinks that in some cases movable pads are decidedly better than those which are fixed; that, in oblique inguinal hernia, the pad should press on the course of the canal and on the internal ring and resting upon the pubis but slightly, if at all; that, in direct hernia, the pad ought to be larger, fixed, and resting upon the pubes; that hard pads are in general better suited for compressing the canal and soft ones for direct hernia."—"Bernhard and Huette's Operative Surgery." Van Buren and Isaac's American edition.

FIG. 2782.—Wood's Horse-Shoe Pad Truss. Left.



FIG. 2783.—Tiemann & Co.'s Finger-Pad Truss.



HERNIAL.

TRUSSES.

For Inguinal and Femoral Hernia.

FIG. 2784.—Chase's Truss. Cedar Pad.



FIG. 2785.—Schuppert's Galvanic Truss.

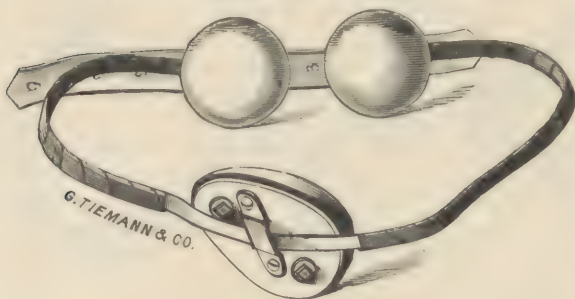


FIG. 2786.—Folsom's Truss.



pressure as will ensure safety in each particular case, without aggravating the condition intended to be relieved. The necessary adjustment of curve is, therefore, given in each case by the hand of the surgeon, before tempering and finishing the instrument. In no other way can the same degree of firmness and efficiency be obtained. The two pads are connected by a single strap, buttoning on studs at their upper part. A double truss is used in every case of hernia.

"The truss is plated with nickel, and, instead of being covered with any absorptive material, is worn over a silk handkerchief or flannel bandage."—*Medical Record*.

All styles and sizes of CELLULOID TRUSSES on hand.

The celluloid truss is composed of a steel spring, finely tempered and covered, or encased with this compound forced on under immense pressure, without any seam and quite as smooth as the finest polished ivory. This material being entirely impervious to moisture or perspiration, the spring is completely protected and preserved from rust, thus rendering it perfectly indestructible. The pad is made of the same material and in different forms, and, being hollow and perfectly smooth, is rendered light, comfortable and pleasant to the person. This coating is not liable to crack in cold weather, nor does it emit any sulphurous or unpleasant odor.

Please order a Truss by letter, as follows :

Messrs. GEO. TIEMANN & CO.

Send to ———, a leather-covered (or celluloid) Truss, of the style illustrated by Fig. ———, for *right*, *left* or *double*.

Inguinal } Reducible Hernia.

Scrotal } See Fig. ———, page ———, and describe accordingly.

Femoral }

Patient : male or female.

Circumference : Crest of ileum, ——— inches.

Pad : large, small.

Perineal Strap : ——— inches long.

Trusses carefully fitted, according to physician's directions, by competent and experienced persons.

A lady will wait on lady customers, at the Branch Store :

STOHLMANN, PFARRE & CO.,
107 EAST 28TH STREET,
NEW YORK.

Large and commodious private parlors. Surgeons who wish to personally superintend the fitting are invited to call with their patients.

"This instrument consists of a back-plate of metal, which rests upon the flat surface at the upper part of the sacrum. To this are hinged two arms of steel, which curve around the pelvis just below the crest of the ileum, to avoid the action of the glutei muscles, but fitting very accurately to the shape of the body. To their extremities are attached the pads, upon which they exert such moderate

HERNIAL.

TRUSSES.

For Inguinal and Femoral Herniæ.

FIG. 2787.—Plain Double Truss. Soft Pads.

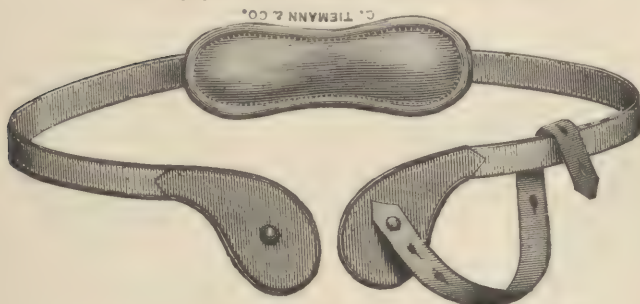


FIG. 2788.—Self Adjusting Double Truss. Ball and Socket.

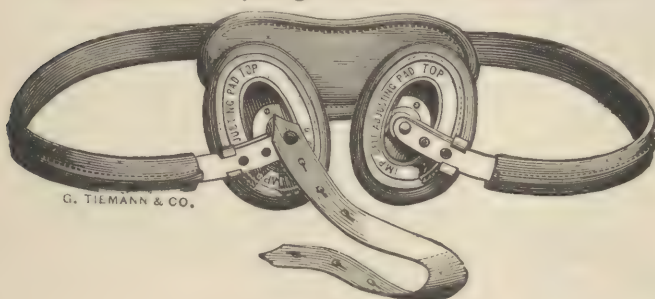


FIG. 2789.—Best French Double Truss. Soft Pads.

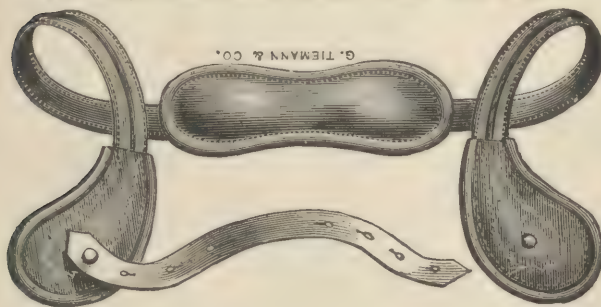
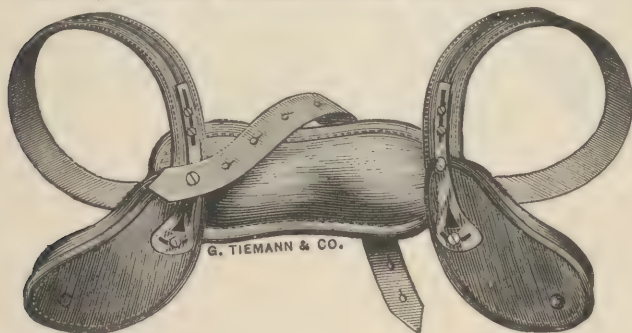


FIG. 2790.—French Adjustable Double Truss. Soft Pads.



"The *symptoms and appearance of inguinal hernia* are generally sufficiently characteristic, but even in the most marked case it is important, by a formal inquiry and the recognized tests, to distinguish it from different affections which occur in these organs and tissues.

"The more noticeable are hydrocele; encysted spermatocele, connected with the epididymis; varicocele of the spermatic veins; inflammation of an old hernial sac and its results; inflammatory affections and other diseases of the testis, cord and their coverings, of inguinal and lymphatic glands; hæmatocele; malpositions of the testis; growth of fat in the connective tissue of the inguinal canal and upon the spermatic cord; diseases of the integuments of the scrotum, especially growths.

"The *truss* selected for the early treatment of this hernia must be preventive and curative. It is of great importance to protect those who, from hereditary tendency or weakness of the abdominal walls, are predisposed to rupture.

"For this purpose a broad band, with a suitable pad (Fig. 2781) may be worn. It should consist of stout elastic web, which passes around the body and is attached to the pad by studs on the pad; elastic bands pass from the body band, under the limbs, to studs upon the rupture pads. If the patient is corpulent two pads should be used, to give more extended support to the abdomen.

"If hernia exists and is reducible, a truss must be selected according to the size of the aperture. It should not press in the tissues, nor invaginate them into the canal, between the pillars of the external abdominal ring, and thus stretch, fray and weaken the intercolumnar fascia. * * * *

"To prevent undue pressure upon the cord, which may be so great and long continued as to cause atrophy of the testicle, a pad has been advised with a slit or chink (Fig. 2782), which gives a horse-shoe shape, the shorter end lying upon Poupart's ligament, immediately outside and above the spine of the pelvis, the longer end lying on the inner pillar; the inner border of the pad being parallel to the outer edge of the rectus muscle, while the round part presses upon the internal ring, and the movable cord slips into the chink between the two points of the pad and escapes all injury."—"Operative Surgery." Stephen Smith.

HERNIAL.

TRUSSES.

Warren's Trusses, for Abdominal Hernia.

FIG. 2791.—Warren's Umbilical Truss.
To be worn after operations.

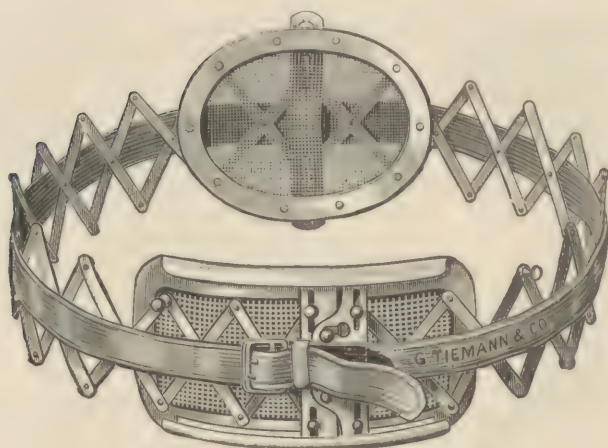
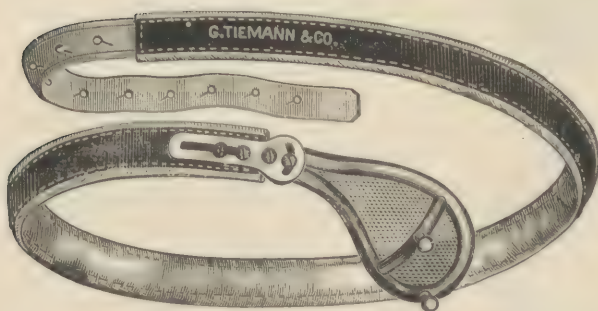


FIG. 2792.—Warren's Double Truss.



FIG. 2793.—Warren's Single Truss.



as it is non-corroding and covered with the best grained morocco or russia leather. I call the attention of the profession to this truss as the most practical one I have ever seen. It is the truss I should recommend to those who are adopting the method of subcutaneous injection in their practice. It is, of course, free from all patent or trade-mark."—
"A Practical Treatise on Hernia." J. H. Warren. 1882.

"Ever since I began to operate for hernia by the method of subcutaneous injection, I have been troubled to obtain a suitable truss to be worn by the patient. * * * I have devised a truss which, I think, will meet all demands. The pad is composed of a rim of hollow tubing, in sizes from No. 12 to No. 21, over which very fine wire gauze is tightly drawn and soldered neatly and securely. The plane of the pad is slightly concave, in order to accommodate it to all the anatomical relations, and can be still further adjusted by the surgeon to any individual case. The gauze being drawn tightly over this rim gives us a flat pad which presses upon the body like a human hand, the best of all trusses. The pad is soldered at its neck to the spring, and is so shaped that it will not press upon the spermatic cord in scrotal hernia, nor too hard upon Poupart's ligament in femoral. Neither will it glide over the ligament and slip into the groove of the groin, as does the common pad. There is a bridge of tubing over the pad, which serves to strengthen it, and may also assist in retaining in apposition to the body a sponge, either medicated or moistened simply with cold water, for the purpose of reducing inflammations. The pressure of the pad can be applied in any desired direction, for there are three knobs for the attachment of the strap. Between the pad and the integuments a layer of cotton flannel, either single or double, should be placed; this can be renewed by the patient as often as desired. The perineal band consists of a small gum rubber tubing or a coarsely braided silken cord.

"It will be evident to all that this is a very light and comfortable truss. It is *hygienic*, and is accurately fitted to the parts. It is *anatomical*, because it tends to draw the pillars of the rings together rather than to separate them. Hence, even if used without the operation of injection, such a truss is better fitted to effect a cure than any convex pad in use.

"The springs are of two degrees of stiffness. One is very soft and gentle in its action, and is adapted for use after the operation of subcutaneous injection. It can be applied in eight or ten days after the operation. The other is stronger, and is better adapted for all those forms of hernia where a truss is to be worn. It can be worn with perfect ease night and day without removal,

HERNIAL.

TRUSSES AND BANDAGES.

For Umbilical Hernia.

FIG. 2794.—Chase's Umbilical Truss.

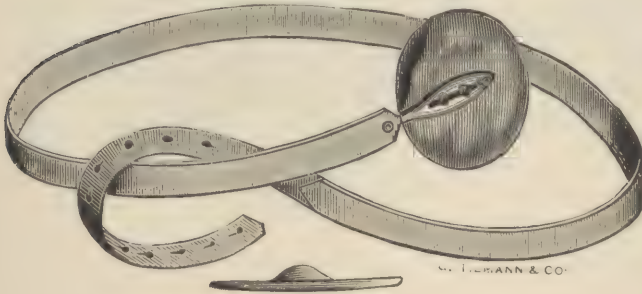


FIG. 2795.—Bow Spring Umbilical Truss.

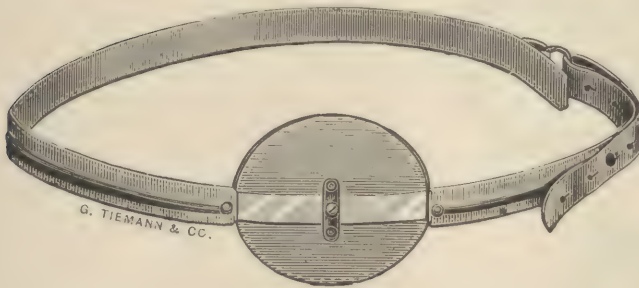
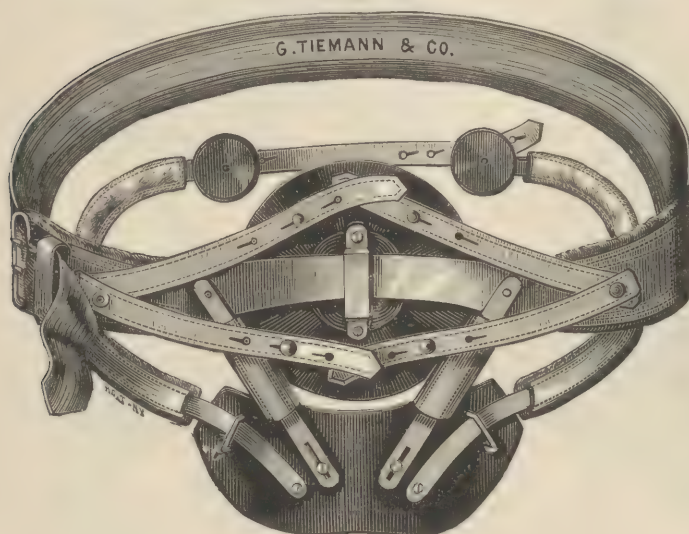
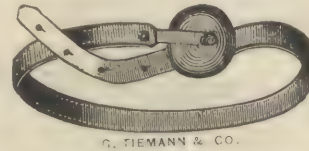


FIG. 2796.—Walker's Combination Supporter, for Umbilical and Abdominal Hernia.



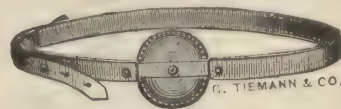
The order for an *umbilical bandage or truss*, for patients who can not call on us for adjustment, should be accompanied by the following measurements: 1. Diameter of the protuberance; 2. Circumference of the body at the umbilicus.

FIG. 2797.—Children's Umbilical Truss with crescent spring, hard or soft pads.



Has a hard wooden pad, and is a comfortable appliance for corpulent persons, as well as for children. Being light and cool, it is very agreeable for summer wear.

FIG. 2798.—Children's Bow Spring Umbilical Truss.



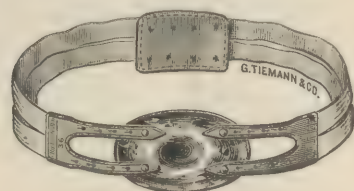
The spring of this truss is made in form of a bow, the convex side of which, supporting the pad, is applied to the rupture. It is forced to conform to the shape of the body by drawing it tight.

FIG. 2799.—Umbilical Bandage.



These bandages are made of linen, satin-jean, or canvas, with hard pads of wood, cork, lead, &c., and with soft pads made of sponge, horse-hair, or of india rubber inflated with air.

FIG. 2800.—Elastic Umbilical Truss, with transparent celluloid pad.



HERNIAL.

ABDOMINAL SUPPORTERS.

For Hypogastric, Perineal, Vaginal and Diaphragmatic Hernia.

FIG. 2801.—Bow-Spring Abdominal Supporter.

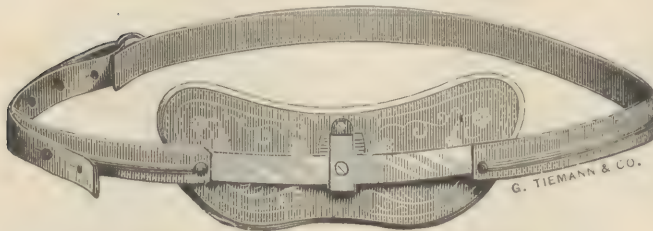


FIG. 2802.—Eugene Abdominal Supporter.

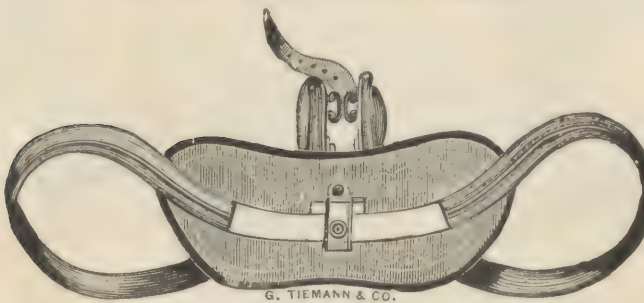


FIG. 2803.—Fitch's Abdominal Supporter.



FIG. 2804.—London Abdominal Supporter.

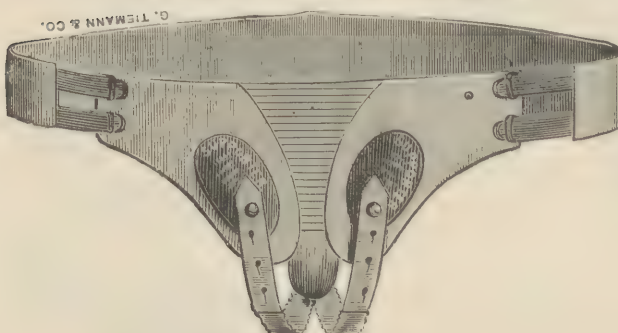


FIG. 2805.—Elastic Belt.



Cotton Elastic Abdominal Belt.
Braun's Abdominal Supporters.
Phelp's Abdominal Supporter.
Dugas' Abdominal Supporter.
Boston Abdominal Supporter.
Riding Belts, with stays, lined
with chamois.
Canvas Abdominal Belts.
Satin-jean Abdominal Belt.

FIG. 2806.—Thomas' Supporter.

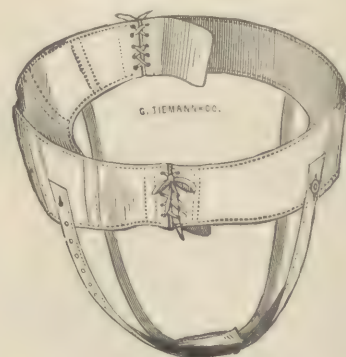


FIG. 2807.—Noeggerath's Supporter.

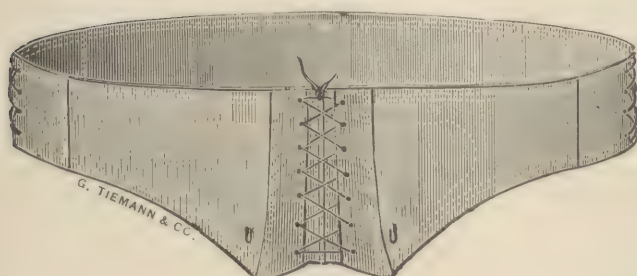


The order for an abdominal supporter should be accompanied with the measure around the pelvis.

HERNIAL.

ABDOMINAL SUPPORTERS.

FIG. 2808.—Abdominal Bandage.



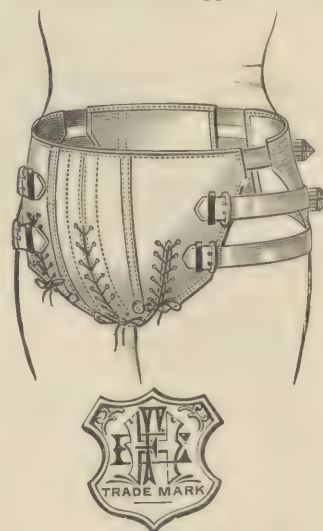
We have on hand cotton elastic abdominal belts, canvas riding belts, satin-jean, abdominal belts, &c.; also Brauns', Phelps', Dugas' Scanzoni's, the Boston, and a variety of other supporters, and make to order any other pattern desired. With the order for any of the above please send measure around the pelvis.

SUPPORTERS AND TRUSSES carefully fitted, according to physician's directions, by competent and experienced persons.

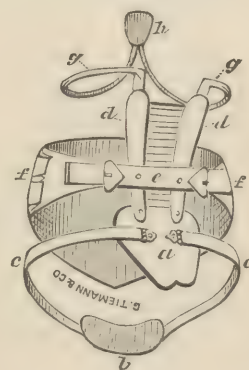
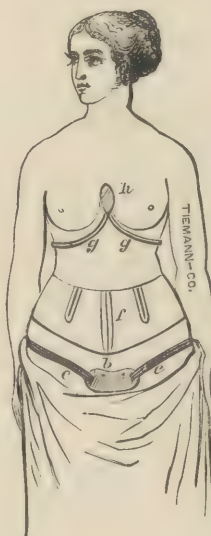
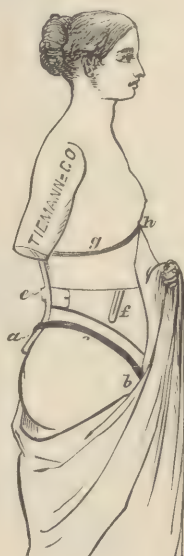
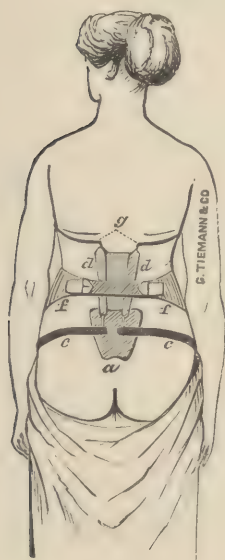
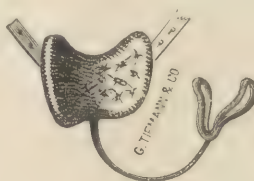
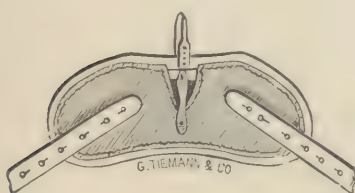
A lady will wait on lady customers at the Branch Store, STOHL-MANN, PFARRE & Co., 107 East 28th Street. Large and commodious private parlors.

Surgeons wishing to personally superintend the fitting are invited to call with their patients.

FIG. 2809.—Hofmann's Adjustable Abdominal Supporter.



See "PROLAPSUS ANI AND PILE SUPPORTERS," page 312.



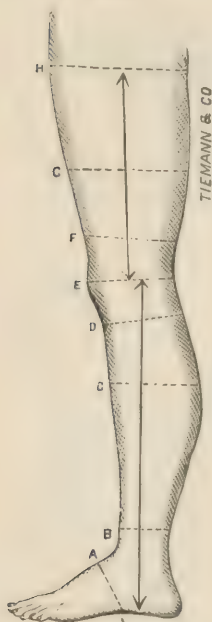
VARIX.

DILATATION OF A VEIN. VARICOSITAS, VARICOSITY.

"Varices are owing to local retardation of the venous circulation; and, in some cases, to relaxation of the parietes of the veins. They are very common in the superficial veins of the lower limbs, especially of pregnant females. The tumor or tumors formed by varices are soft, knotty, unequal, indolent and livid; without pulsation, and yielding readily to the impression of the finger, but returning as soon as the compression is discontinued. Sometimes the vein bursts and gives rise to hæmorrhage. The treatment is usually palliative, and consists in exerting a uniform and constant pressure upon the parts by means of an appropriate bandage. The radical cure has, also, been obtained by extirpation, division of the vein, or ligature. The second course is apt to be followed by phlebitis."—DUNGLISON.

"Varicose veins are not confined to the lower extremities. They are found in other parts of the body wherever obstruction to venous circulation exists. The mechanical means required for their treatment consist in the application of elastic support, formed of rubber cord covered with silk or cotton and worked into the form of *stockings* or *arm and wristlets* for the extremities. For the trunk it takes the shape of a *belt*, or the surgeon may apply *Martin's rubber bandage* (see page 74), which, is however, inconvenient for the patient's own management.

FIG. 2810.
Silk and Cotton Elastic
Hose.



Directions for Measuring.

Indicate the *exact* measure around the limb, in inches, opposite the dotted lines on the cut (we allow for pressure). Also give the length of stocking from floor or plane upon which the foot rests.

FOR THIGH HOSE, to cover the entire limb, measure at *A, B, C, D, E, G, H*.

Length from floor to *E*, inches.
Length from floor to *H*, inches.

FOR HALF THIGH HOSE, to reach to *G*, measure at *A, B, C, D, E, G*.

Length from floor to *E*, inches.
Length from floor to *G*, inches.

FOR KNEE HOSE, to reach to *F*, measure at *A, B, C, D, E, F*.

Length from floor to *E*, inches.
Length from floor to *F*, inches.

FOR THREE-QUARTER HOSE, to reach to *D*, measure at *A, B, C, D*.

Length from floor to *D*, inches.

FOR KNEE CAP, measure at *D, E, F*.

Length from *D* to *E*, inches.
Length from *D* to *F*, inches.

FOR ANKLET, measure at *A, B*.

Length from floor to *B*, inches.

We have constantly in stock a large assortment of best qualities of Silk and Thread Elastic Hose, for the treatment of varicose veins, sprains, weak joints, &c.

Elastic Abdominal Belts, Stockings, Wristlets and Armlets made to order.

	EACH.		EACH.
Silk Elastic Leg and Thigh Hose to <i>H</i> , best, . . .	\$12.00	Cotton Elastic Half Thigh Hose to <i>G</i> , . . .	\$5.50
Silk Elastic Half Thigh Hose to <i>G</i> , best, . . .	10.00	Cotton Elastic Knee Hose to <i>F</i> , . . .	3.50
Silk Elastic Knee Hose to <i>F</i> , best . . .	8.00	Cotton Elastic Three-quarter Hose to <i>D</i> , . . .	2.00
Silk Elastic Three-quarter Hose to <i>D</i> , best, . . .	4.50	Knee Cap, Best Silk Elastic, . . .	3.50
Fine Silk Elastic Knee Hose to <i>F</i> , . . .	6.00	Knee Cap, Fine Silk Elastic, . . .	3.00
Fine Silk Elastic Three-quarters Hose to <i>D</i> , . . .	3.50	Knee Cap, Cotton Elastic, . . .	1.75
Cotton Elastic Leg and Thigh Hose to <i>H</i> , . . .	6.50	Anklets, . . .	1.75 to 3.00

Wristlets and Armlets made to order.

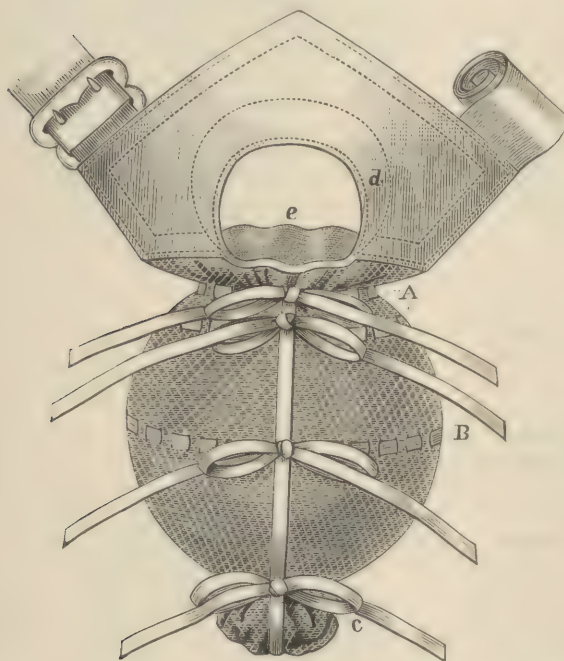
Silk Elastic Abdominal Belt,	\$12.00	Silk Elastic Abdominal Belt, with Stays, . . .	\$14.00
Cotton Elastic Abdominal Belt,	\$8.00		

VARICOCELE.

OSCHEOCELE VARICOSA, HERNIA VARICOSA, RAMEX VARICOSUS, SPERMATOCELE, CIRSOCELE.

"A varicose dilatation of the veins of the scrotum and spermatic cord; usually by English and American writers restricted to the latter, like circocèle. This latter variety of the disease is more common on the left side than the right; it appears under the form of a soft, doughy, unequal, knotty, compressible and indolent tumor, situate in the course of the cord, and increasing from below upwards. It is less when the individual is in the recumbent posture, and increases when he is erect. It is, ordinarily, an affection of no moment, and is very common, requiring merely the use of a proper suspensory bandage. It has been advised, in bad cases, to tie the enlarged vein, but the operation is not free from danger induced by phlebitis. Sir A. Cooper has proposed the removal of a portion of the scrotum, so as to render the remainder of it a natural bandage. This plan has been found effectual."—DUNGLISON.

FIG. 2811.—Miliano's Compressor, for Varicocele, Swelling, &c., of the Testes.



The first step in applying the apparatus is to secure for it close apposition to the scrotal organs. This is begun by taking the two ends of the upper lacings on either side (marked A), and by pulling uniformly on each, the diameter of the upper part of the appliance is contracted and closed around the spermatic cord, above the testes, so as to prevent the latter escaping. The bandage being shirred snugly, is held in position by tying the lacings in a bow-knot under the penis. The next step is to similarly shirr and tie the lowest set of lacings, which closes and shortens the bandage below the testicle (marked C). This produces counter-action and compression against the upper set of lacings, care being taken to exclude any fold of the scrotum.

The next lacings above the lowest set (marked B), which encircle the middle of the scrotal organs, not to constrict as shown at A and C, but be shirred *only* snugly enough to be comfortable. In a few hours, or sooner, according to the nature of the disease (as in the reduction of varicocele) the compression acts upon the absorbents, and the enlargement of the scrotal organs begins to abate. As this reduction of the scrotal contents progresses, the sets of lacings (marked A and B) are to be tightened in order to maintain equable compression.

FIG. 2812.—Single Front Suspensory.



FIG. 2813.—Double Front Suspensory. Made with and without Strings.

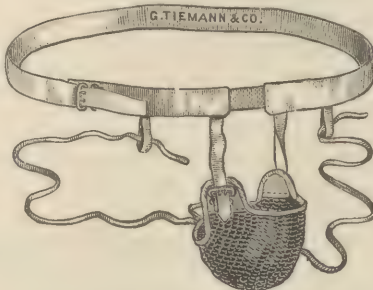


FIG. 2814. Doisneau's Compress for the Seminal Cords.

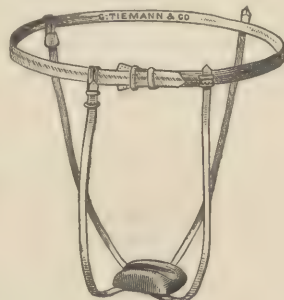
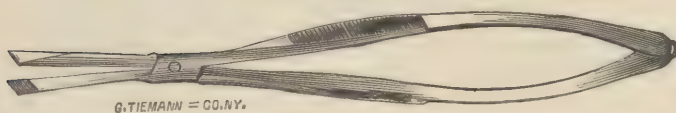


FIG. 2815.—Henry's Depilating Forceps.



We keep in store a large assortment of SUSPENSORY BANDAGES of all kinds and patterns, made of silk, linen, cotton and leather.

VARICOCELE.

VARICOCELE, OSCHEOCELE VARICOSA, HERNIA VARICOSA, RAMEX VARICOSUS, SPERMATOCELE, CIRSOCELE.



FIG. 2816.—Lewis' Varicocele Clamp.

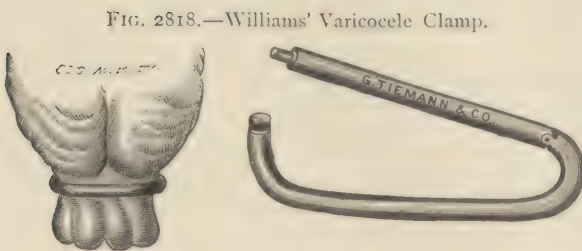


FIG. 2818.—Williams' Varicocele Clamp.

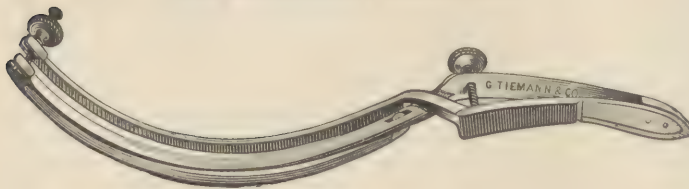


FIG. 2819.—Henry's Scrotal Clamp.

FIG. 2817.—Williams' Varicocele Clamp.



This instrument and the method of applying it are represented in the cut. It is made of a soft flexible metal, so that, after being applied, the two bars can, if necessary, be pressed a little closer together. The method of applying it is as follows: the clasp, being tightly closed, is slipped upon the scrotum sufficiently high up to support the testicles in their proper position; it will generally be retained there without any trouble, but if inclined to slip off, the bar may be pressed a little closer together.

This instrument has two double-curved blades, made of steel, it embraces, when placed in front of the scrotum, the entire and exact portion which it is desired to remove. The coapting surfaces are evenly notched to prevent the tissues from slipping. The screws are not adjusted until the operator is perfectly satisfied that he has embraced the exact portion to be

removed in front of the blades. The extra blade is easily inserted with a little pressure, and removed as easily by pressing downward and forward; it is then dislodged by slightly raising the extreme end. When in position it leaves a fenestra to afford the surgeon the facility of inserting all his ligatures, should he prefer it, before dividing the parts. The thickness or amount of the tissue left in front of the main blade and between that and the extra blade, which is the guide for the part to be removed, is ample to assist union, and if the division be a clean one, and the stitches are close and evenly inserted, the pressure and tension is so slight, or rather divided, over the entire cut surfaces, that there is little probability of ulceration through the stitches before union has taken place.

When the part has been removed the extra blade is displaced, leaving a free border exposed in front of the main blade about a quarter of an inch in thickness. In a few minutes the whole wound can be stitched without any inconvenience. The clamp is, of course, not removed until this is accomplished.

Besides the clamp, the only instruments necessary are the scissors or scalpel, needles, with either silk or fine silver wire for sutures, a few acupressure needles, a few *serres-fines*, silver pins, and some adhesive plaster.

FIG. 2820.—Henry's Cartilage Scissors.

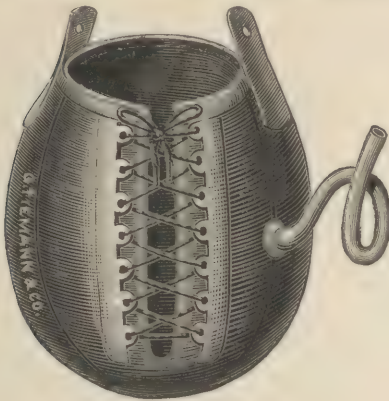


"To ensure an easy and clean removal of the part, I use a cutting instrument which I have named cartilage-scissors. These can be grasped and handled with the utmost ease, and, by the aid of springs, are self opening. They are curved on the flat side."—M. H. Henry, M. A., M. D., &c.

HERNIA HUMORALIS.

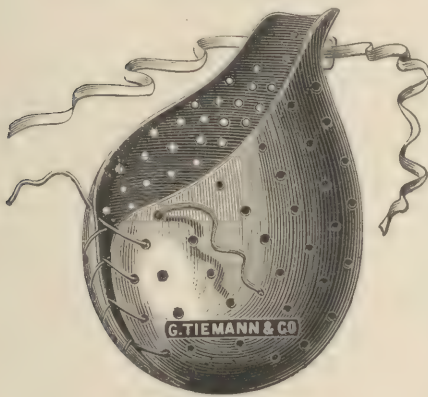
EMPRESMA ORCHITIS, DIDYMITIS, ORCHITIS, ORCHIDITIS, TESTITIS, INFLAMMATIO TESTIUM, INFLAMMATION OF THE TESTICLE, SWELLED TESTICLE, HERNIA VENERIS, ORCHIOCELE, ORCHIDOCELE, ORCHIDONCUS, (F.) INFLAMMATION DU TESTICULE, ORCHITE.

FIG. 2821.—Hawes' Orchitis Compressor.



"Swelling and inflammation of the testicle is a common symptom of gonorrhœa, (F.) *Chaudépisse tombée dans les Bourses* ; but it may arise from external injuries or from other causes. It is a disease which cannot be mistaken, and the treatment must obviously be strongly antiphlogistic, supporting the testicle during the treatment and for some time afterwards ; methodical compression has also been found useful. The disease is not generally of a serious character, going off as suddenly as it comes on. As it effects the epididymis more especially, when supervening on gonorrhœa or blennorrhœa, it is sometimes termed *blennorrhagic epididymitis* or *gonorrhœal orchitis*."—DUNGLISON.

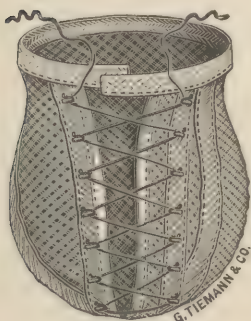
FIG. 2822.
White's Elastic Scrotal Compressor.



Hawes' Orchitis Compressor is composed of two rubber bags, the inner one easily distensible, and united so as to form an air-tight compartment between the outer and inner layers. A small rubber tube perforates the outer layer. Placing the swollen testicle within the bag, its mouth completely encircling the cord, it is carefully closed by lacing ; air is then blown from the mouth or by a syringe through the rubber tube into the air-tight space, and prevented from escaping by simply tying the tube. Instead of air, hot water may be used.

"White's Elastic Scrotal Compressor is shell-shaped, very light and symmetrically molded to receive and accommodate within its cavity a swollen testicle, surrounded by its scrotal integuments. The material of which it is composed is hardened rubber, special care being taken to render the walls as thin and light as possible. The peculiar shape selected has been found by experience to afford the very best mechanical support to the pendulous organ. The cleft, running down the front of the shield, is intended to admit of free overlapping of the two thin edges. By this means ample provision is made for all necessary reinforcement of compression which is to be practiced during the management of the case."—*Boston Medical and Surgical Journal*, January 29, 1880.

FIG. 2823.—Carroll's Orchitis Compressor.



"Carroll's Orchitis Compressor is a bag of webbing like that of the common suspensory, open at one side, is bound at its mouth with a strip of flexible metal, which can be wrapped above, and thus made to isolate and control the affected testicle. The side opening is then laced from below upwards with elastic cord, which maintains its elastic tension as the testis decreases in size, or may be loosened or tightened as occasion may demand. Not the least advantage of this appliance is that the patient can remove and readjust it for purposes of cleanliness."—*Medical Record*, March 19, 1881.

VARICOCELE.

SUBCUTANEOUS LIGATION OF THE DILATED VEINS.

FIG. 2824.—Keyes' Varicocele Needles.



"I have two varieties of needles, both straight, in handles; one has a lance-shaped point, the other a point like a hypodermic needle. The former I prefer when any of the thickened tissues of the cords have to be pierced, the latter when a single large vein can be isolated from all the other tissues, as is sometimes the case. Both needles have a long eye. The needle is threaded with a loop of silk, or a thin whale tendon (carbolized), and a piece of carbolized catgut. The scrotum is to be thoroughly washed out with a solution of bichloride of mercury, one in one thousand, and all instruments, ligatures and the operator's hands to be soaked constantly in the same solution. Ether is not admissible, as the patient must stand up. A few drops of four per cent. solution of cocaine, thrown under the skin near the point of proposed puncture, will nullify the pain in the case of exceptionally nervous patients.

"After the first puncture, faintness on the part of the patient is no bar to a successful completion of the operation, for the patient may then be placed on his back and the operation finished, with a certainty that the dilated veins are included in the ligature, if only the first puncture has been successfully made.

"The patient stands near the bed, in a good light. The veins which it is proposed to occlude are separated in the usual manner from the rest of the spermatic cord, at a point rather high up, where the separate dilated trunks may be made out as straight and not convoluted dilated channels. The big veins are pushed out toward the thigh of the affected side, and the scrotal tissues between the veins and the rest of the cord are tightly pinched by the thumb and finger of the operator's left hand, placed behind and in front of the scrotum.

"Now the needle, properly armed, is boldly thrust through the scrotal tissues from before backward at the point pinched, leaving the veins on the outer side of the needle toward the thigh. The eye of the needle is made to emerge at the back of the scrotum. A tenaculum seizes the catgut ligature and pulls it out of the eye of the needle, leaving it sticking out freely from the posterior wound alongside of the shaft of the needle. Now the point of the needle is withdrawn within the scrotum, leaving the catgut end outside. The veins are allowed to join the rest of the spermatic cord. The point of the needle is not to be withdrawn outside the anterior point of puncture in the scrotum. When the veins have passed internally to the point of the needle, the latter, still charged with its loop of silk or whale tendon, is manipulated around externally to the veins under the scrotal integument, and is made to emerge accurately at the posterior hole, the original point of puncture in the scrotum. This is the most important step in the operation, and the only one at all difficult to execute nicely. When the eye of the needle has emerged posteriorly, charged with its loop of silk, the tenaculum again is called into play to loosen the loop and to draw through it the free end of the catgut which was left at the first puncture protruding posteriorly from the scrotum. The parts are again dashed with the antiseptic bichloride solution, and the needle and loop (containing the catgut) are rapidly withdrawn. Now it will be found that a few filaments of the dartos (or other tissue), just within the posterior wound in the scrotum, are included in the catgut loop. These are torn away by simply holding the free ends of the catgut in front and pulling upon the scrotum behind. The thin tissues will be felt to tear, and the patient will complain of little pain.

"Finally, the few hairs about the anterior wound are to be seized with the thumb and finger and pulled out—else they certainly will be tied into the knot and cause trouble—and the catgut (again drenched with bichloride solution) is tied tightly to a triple knot, cut off short, and the scrotum pulled away. The knot sinks out of sight, and the operation is terminated by placing small pieces of plaster over the minute points of puncture, if any blood exudes. If the operation is well done, in twenty-four hours it is difficult to detect the points of puncture."—E. L. Keyes, M. D. *Medical Record*, February 20, 1886.

HYDROCELE.

"A term generally applied to a collection of serous fluid in the areolar texture of the scrotum, or in some of the coverings, either of the testicle or spermatic cord. To the first of these varieties the names *external hydrocele* (*h. adematodes*) have been given; and, to the second, those of *hydrocele interna* (*h. tunica vaginalis testis*). When the collection occurs in the envelope of the testicle it is called *h. of the tunica vaginalis*; and the epithet, *congenital*, is added; *hydrocele congenita*, when the interior of the membrane in which it is situate still communicates freely with the cavity of the abdomen. When it exists in the spermatic cord it is called *encysted* or *diffused hydrocele of the spermatic cord*, *hydrocele cystica*, *hydrocele funiculi seminalis*, as the case may be. The tumor of the distended scrotum is oblong; greater below than above; indolent and semi-transparent. When it becomes inconveniently large, the fluid

HYDROCELE.

HYDROCELE. (Continued.)

may be evacuated by puncturing with a trocar; but, as it collects again, this operation can only be considered palliative. The radical cure consists, usually, in injecting some irritating fluid through the canula of the trocar, which has been left in after puncturing. This is kept in the tunica vaginalis for a few minutes and then withdrawn. The coat inflames, adhesion takes place, and the cavity is obliterated."—DUNGLISON.

See "PARACENTESIS, TROCARS," page 126; "RUBBER BAG FOR HYDROCELE," Fig. 1712.

Method of E. L. Keyes, M. D.

"The apparatus I employ is a glass syringe, holding one hundred minims, having for its nozzle an ordinary hypodermic point, not the very smallest size. If the cyst is small this point is thrust into it and the clear contents drawn out with the syringe. Then the latter is unscrewed from its point, rapidly and thoroughly washed, and promptly filled with pure carbolic acid, deliquesced with a little glycerine. The syringe is now screwed again upon the point, which has been left sticking in the cyst, and from thirty to sixty minims of the deliquesced acid thrown in. The point is now withdrawn and the whole operation terminated, with not much more trouble than it takes to give a hypodermic injection.

"When the hydrocele is large I modify the operative method as follows: I first insert the hypodermic point and see that a drop of clear serum oozes from it. I now puncture the cyst at another point with a fine aspirating needle, empty the contents, and withdraw the aspirating needle. I then screw the glass syringe upon the hypodermic point first introduced, and throw in the drachm of deliquesced acid, which appears to be all that is required to accomplish the cure. Nothing is easier; no operation of minor surgery in my hands has been more satisfactory in its results."—*Medical Record*, February 20, 1886.

See "HYPODERMIC SYRINGES," page 123, and "ASPIRATORS," page 131.

PHIMOSIS.

"*Phimosis*, improperly "*phymosis*" (φύμωσις, *I bind tight*), a disease which consists in a preternatural narrowness of the opening of the prepuce, so that it cannot be carried behind the corona glandis. This affection is most commonly congenital. Sometimes it is accidental, and dependant upon tumefaction of the glans, or of the prepuce, as it occurs in syphilis. To remedy this state, the prepuce may be divided by means of a bistoury and director, or circumcision may be practiced."—DUNGLISON.

"In performing this operation it is important to seize the orifice of the prepuce for the purpose of making suitable traction on the mucous membrane, which is but slightly elastic compared with the skin. First insert a well-oiled probe under the prepuce and sweep the surface of the glans to break up adhesions, seize the orifice of the prepuce at opposite points, with sharp-toothed forceps, drawing the whole forwards until the mucous membrane is put well upon the stretch; grasp the prepuce firmly just in front of the glans with a clamp or forceps, with a bistoury cut away any portion anterior to the forceps; if the prepuce readily retracts, the angles may be cut away, and the mucous and skin flaps united by a number of fine sutures; if the prepuce is not free, all tightness must be relieved by an incision on the dorsum, or, in infants, by tearing the tissues. The cut mucous membrane must be attached to the skin by sutures."—"Operative Surgery," Stephen Smith.

FIG. 2825.—Probe and Spatula for the Frænum.

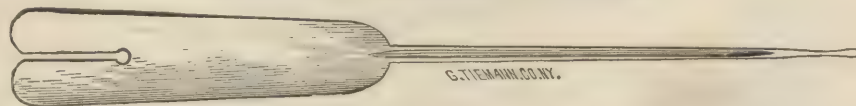
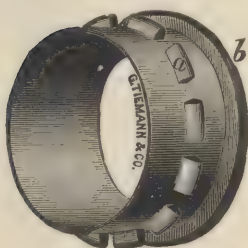


FIG. 2826.—Ross' Circumcision Ring.



"It is a light flat ring, made of hard rubber, with two ridges upon its outer surface, the posterior one, *b*, continuous, the anterior one, *a*, interrupted or notched. It is to encircle the penis in the cul-de-sac under the prepuce, the latter being drawn forward over the instrument and compressed against it, in the groove between the two ridges, by a small cord wound around its integumentary surface. The foreskin is then to be severed just in front of the anterior or notched ridge by a circular sweep of the knife, the angle formed by the ridge and the horizontal surface serving as a director. The notches in the anterior ridge are to facilitate introduction of the sutures."—Surgeon J. W. Ross, U. S. N. *Medical Record*, September 26, 1885.

PHIMOSIS.

FIG. 2827.—Hutchinson's Forceps, for Rupturing the Mucous Membrane of the Prepuce.

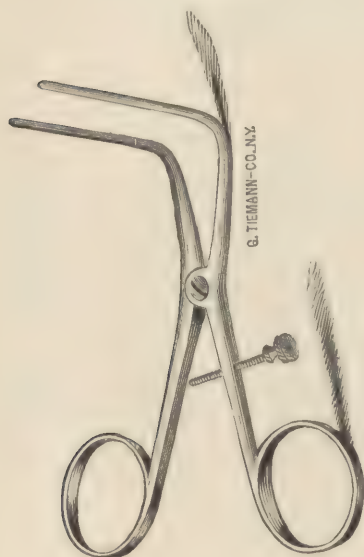


FIG. 2828.—Baruch's Circumcision Scissors.

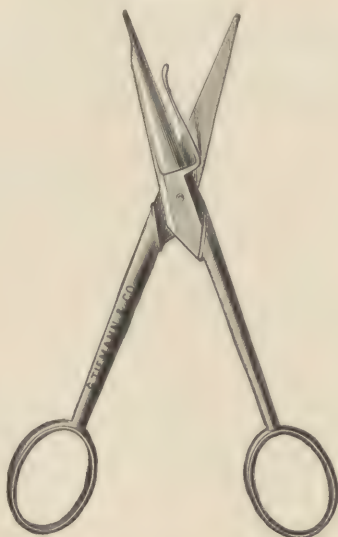


FIG. 2829.—Nelaton's Phimosis Forceps.

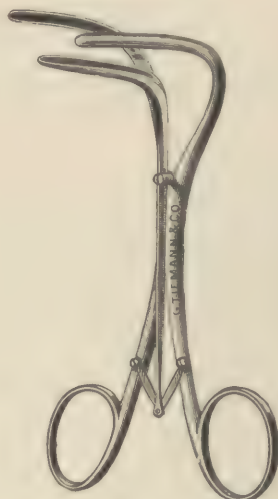


FIG. 2830.—Fisher's Phimosis Forceps.

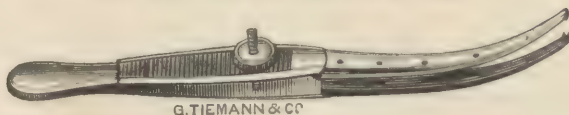


FIG. 2831.—Roger's Phimosis Forceps.

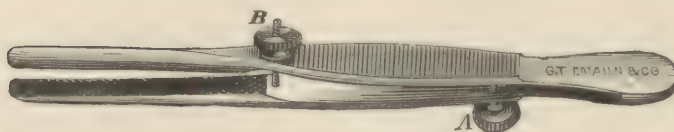


FIG. 2832.—Henry's Phimosis Forceps.

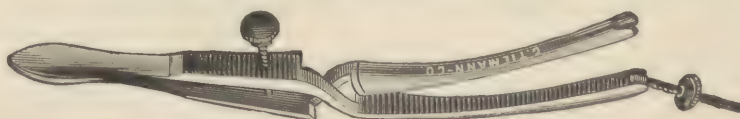


FIG. 2833.—Levis' Phimosis Forceps.



FIG. 2834.—Knox's Phimosis Forceps.



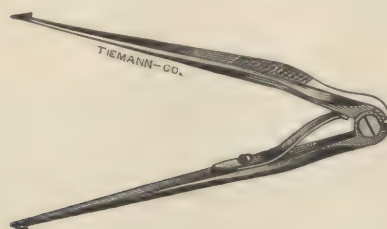
FIG. 2835.—Skillern's Phimosis Forceps.



With backward set teeth, for holding the inner inelastic mucous membrane without the risk of slipping whilst it is put upon the stretch. The blades are separated by the screw.

PHIMOSIS.

FIG. 2836.—Girdner's Phimosis Forceps.



It is introduced into the preputial opening closed; then, relaxing the spring, causes the the barbs to transfix, first, the mucous membrane, and then the skin.

FIG. 2837.—Cohn's Phimosis Forceps.

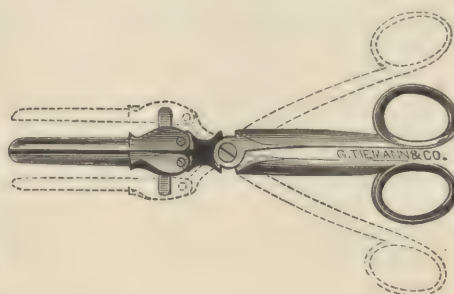


FIG. 2839.—Taylor's Phimosis Scissors.

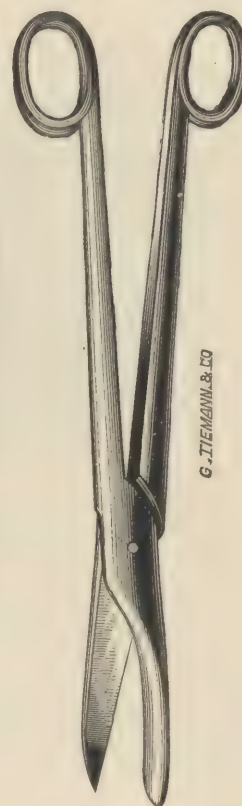
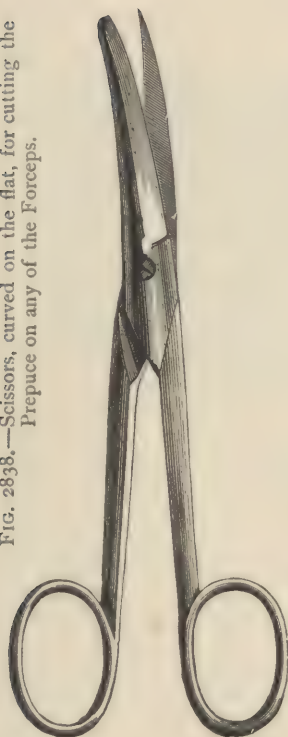


FIG. 2838.—Scissors, curved on the flat, for cutting the Prepuce on any of the Forceps.



Dr. R. W. Taylor's procedure consists in making two incisions, one on either side, exactly in the middle of the lateral portion of the prepuce with a pair of strong scissors (Fig. 2839). The result of this operation is that the prepuce is converted into two flaps—an upper and a lower—with the glans penis between them, and the upper flap can be elevated and the lower one depressed with the greatest ease, so as to expose the whole surface. Then, after the acute disease has subsided and the edges of the incisions have healed, these flaps may be snipped off without confining the patient to the house or taking him away from business. But, it will be objected, you thus have double the amount of raw surface exposed to contagion. Very true, but the advantage gained is more than a counterbalance, and, moreover, if the incision be properly cauterized and dressed, contagion will in most cases be avoided. The caustic preferred by Dr. Taylor is pure carbolic acid, rendered fluid by a small quantity of water. Four pieces of lint are to be cut—two to fit the glans, the one above and the other below—and two strips to place between the cut surfaces. These pieces of lint are soaked in the acid and put in their places; the flaps are then brought together and a bandage wound around the penis, allowing the meatus to be free. The whole should be kept wet with cold water, and the dressing repeated daily until the parts are healed.

FIG. 2840.—Taylor's Syringe, for Sub-preputial Injections.



"If, from any cause, an operation be impracticable, the subject of congenital phimosis should be directed at each act of micturition to expose the meatus as fully as possible, in order to prevent the entrance of the

urine beneath the prepuce, and intra-preputial injections should be resorted to if sebaceous matter accumulates or any signs of inflammation appear. The best syringe for this purpose is one with a broad flattened nozzle, to facilitate its introduction between the prepuce and glans, as proposed by Dr. Taylor."—"Venereal Diseases." Bumstead and Taylor. 1879.

According to the chronology of the Bible circumcision was instituted as a religious rite by Abraham, in the year of the world 2059—nineteen hundred and forty-nine years before Christ. Several of the Eastern nations still practice it as a hygienic measure.

URETHRAL.

NORMAL MALE URETHRA.

"The urethra extends from the neck of the bladder to the meatus urinarius. It presents a double curve in the flaccid state of the penis, but in the erect state it forms only a single curve, the concavity of which is directed upwards. Its length varies from eight to nine inches; and it is divided into three portions, the prostatic, membranous and spongy, the structure and relations of which are essentially different.

"The *prostatic portion* is the widest and most dilatable part of the canal. It passes through the prostate gland, from its base to the apex, lying nearer its upper than its lower surface. It is about an inch and a quarter in length; the form of the canal is spindle-shaped, being wider in the middle than at either extremity and narrowest in front, where it joins the membranous portion. A transverse section of the canal in this situation is triangular, the apex directed downwards. Upon the floor of the canal is a narrow longitudinal ridge, the *verumontanum*, or *caput gallinaginis*, formed by an elevation of the mucous membrane and its subjacent tissue. It is eight or nine lines in length, and a line and a half in height; and contains, according to Kobelt, muscular and erectile tissues.

"When distended it may serve to prevent the passage of the semen backwards into the bladder. On each side of the verumontanum is a slightly depressed fossa, the *prostatic sinus*, the floor of which is perforated by numerous apertures, the *orifices of the prostatic ducts*, the ducts of the middle lobe opening behind the crest. At the forepart of the verumontanum, in the middle line, is a depression, the *sinus pocularis* (vesicula prostatica); and upon or within its margins are the slit-like openings of the ejaculatory ducts. The sinus pocularis forms a *cul-de-sac* about a quarter of an inch in length, which runs upwards and backwards in the substance of the prostate beneath the middle lobe; its prominent upper wall partly forms the verumontanum. Its walls are composed of fibrous tissue, muscular fibres and mucous membrane; and numerous small glands open on its inner surface. It has been called by Weber, who discovered it, the *uterus masculinum*, from its supposed homology with the female organ.

"The *membranous portion* of the urethra extends between the apex of the prostate and the bulb of the corpus spongiosum. It is the narrowest part of the canal (excepting the orifice), and measures three-quarters of an inch along its upper and half an inch along its lower surface, in consequence of the bulb projecting backwards beneath it below. Its upper concave surface is placed about an inch beneath the pubic arch, from which it is separated by the dorsal vessels and nerves of the penis and some muscular fibres. Its lower convex surface is separated from the rectum by a triangular space, which constitutes the perinæum. The membranous portion of the urethra perforates the deep perineal fascia; and two layers from this membrane are prolonged around it—the one forwards, the other backwards; it is also surrounded by the compressor urethræ muscle. Its coverings are mucous membrane, elastic fibrous tissue, a thin layer of erectile tissue, muscular fibres, and a prolongation from the deep perineal fascia.

The *spongy portion* is the longest part of the urethra, and is contained in the corpus spongiosum. It is about six inches in length, and extends from the termination of the membranous portion to the meatus urinarius. Commencing below the symphysis pubis, it ascends for a short distance, and then curves downwards. It is narrow and of uniform size in the body of the penis, measuring about a quarter of an inch in diameter; being dilated behind, within the bulb, and again anteriorly within the glans penis, forming the *fossa navicularis*. A cross section of this canal in the body of the penis has its long diameter transverse; but, in the glans, that diameter is directed vertically.

"The *bulbous portion* is a name given, in some descriptions of the urethra, to the posterior dilated part of the spongy portion contained within the bulb.

"The *meatus urinarius* is the most contracted part of the urethra; it is a vertical slit, about three lines in length, bounded on each side by two small labia. The inner surface of the lining membrane of the urethra, especially on the floor of the spongy portion, presents the orifices of numerous mucous glands and follicles, situated in the submucous tissue and named the *glands of Littré*. They vary in size, and their orifices are directed forwards, so that they may easily intercept the point of a catheter in its passage along this canal. One of these lacunæ, larger than the rest, is situated on the upper surface of the fossa navicularis, about an inch and a half from the orifice; it is called the *lacuna magna*. Into the bulbous portion are found opening the ducts of Cowper's glands.

"*Structure*.—The urethra is composed of three coats: a mucous, muscular and erectile.

"The *mucous coat* forms part of the genito-urinary mucous membrane. It is continuous with the mucous membrane of the bladder, ureters and kidneys; externally, with the integument covering the glans penis; and is prolonged into the ducts of the glands which open into the urethra, viz.: Cowper's glands, the prostate gland, and the vas deferentia and vesiculæ seminales, through the ejaculatory ducts. In the spongy and membranous portions the mucous membrane is arranged in longitudinal folds when the organ is contracted. Small papillæ are found upon it, near the orifice; and its epithelial lining is of the columnar variety, excepting near the meatus, where it is laminated.

"The *muscular coat* consists of two layers of plain muscular fibres, an external longitudinal layer and an internal circular. The muscular tissue is most abundant in the prostatic portion of the canal. A thin layer of *erectile tissue* is continued from the corpus spongiosum around the membranous and prostatic portion of the urethra to the neck of the bladder."—"Gray's Anatomy."

"In the *female* the urethra is only about an inch long. It is wider than in man and susceptible of great dilatation."

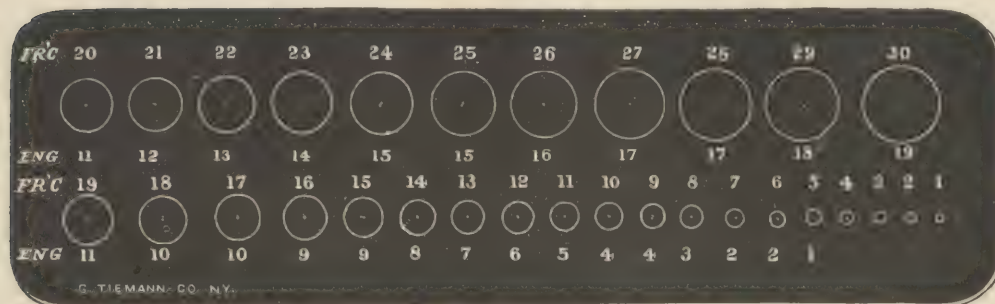
See "GYNÆCOLOGICAL:" *Urethra*.

URETHRAL.

SCALES OR GAUGES.

For Grading the Sizes of Urethral Instruments.

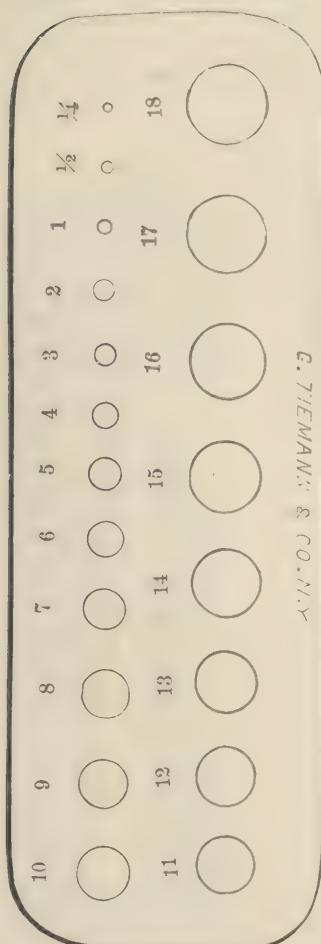
FIG. 2841.—French or Metric Scale.



Comparison by Dr. Bumstead.

The French scale advances one-third of a millimetre in diameter for each size, commencing with No. 1— $\frac{1}{3}$ mm.
The numbers above the openings express French standard, those below them approximately English sizes.

FIG. 2842.—English Numbers.



English Scale.

Modified by Dr. Gouley.
1866.

Originally the English scale ran from No. 1 to No. 12 only; measurement indefinite.

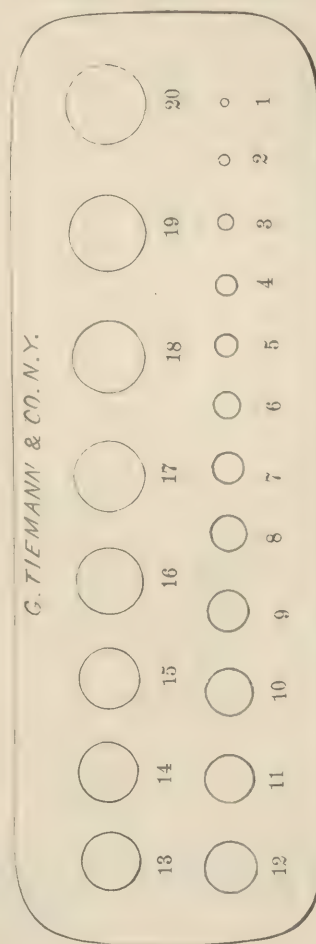
Dr. Gouley has extended it two sizes below No. 1, *i. e.*, No. $\frac{1}{2}$ and No. $\frac{1}{4}$, and six sizes above No. 12, *i. e.*, Nos. 13, 14, 15, 16, 17, 18; making the extremes correspond to those of the French or metric scale.

This gauge, then, consists of twenty numbers, the smallest one millimetre and the largest ten and one-half millimetres in diameter, with a difference between each two numbers of half a millimetre instead of one-third, as in the French scale.

On one side of this gauge is stamped the diameter of each aperture in millimetres, and on the reverse side the numbers of the English scale, which are by this method made definite.

Upon the handle of each Gouley's sound both the English number and the metrical diameter are stamped.

FIG. 2843.—Metrical Diameter.



URETHRAL.

SCALES OR GUAGES.

For Grading the Sizes of Urethral Instruments.

FIG. 2844.
American Scale.

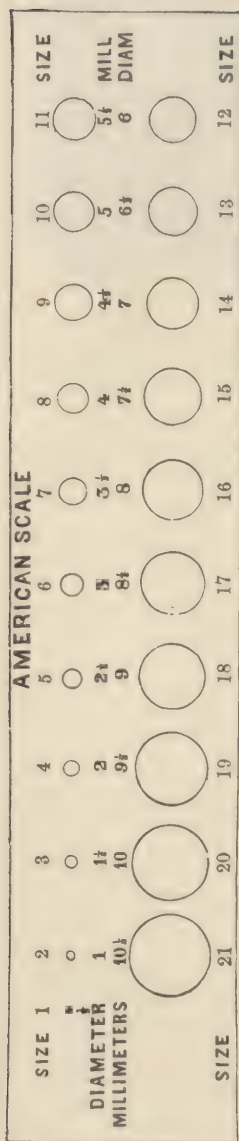
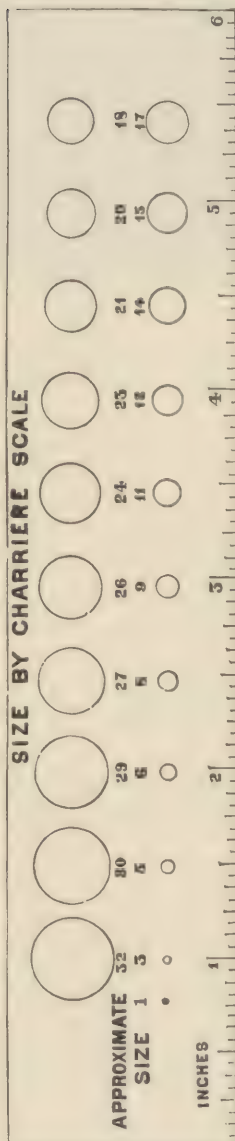


FIG. 2845.—Approximate French Numbers.



The American scale, introduced by Drs. Van Buren and Keyes, advances also by diameters of one-half of a millimetre. The smallest size is half a millimetre in diameter, and is designated No. 1, No. 2 equals one millimetre, No. 3 equal to one and one-half millimetre in diameter, &c.

The American numbers and metrical diameter are stamped upon one side of this scale, the approximate French numbers on the other.

Dr. H. E. Handerson, of New York, has devised a gauge which consists of a plate with a wedge-shaped slot. The instrument to be measured is simply to be inserted in the base of the opening and slid towards the apex as far as it will go, when the parallel lines on either side will indicate its size according to the French, American and English scales.

Dr. C. H. Thomas' Gauge, for measuring the circumference of oval or cylindrical urethral instruments, consists of a graduated tape, into a loop of which the instrument to be measured is placed; when this is drawn tight two arrows indicate the circumference.

Fig. 2847.—Handerson's Gauge.

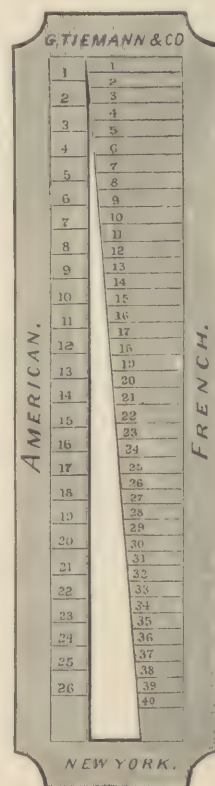
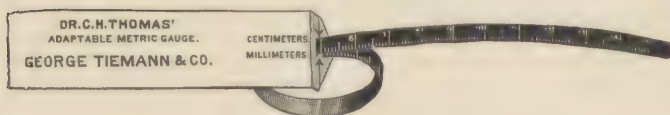


FIG. 2846.—Thomas' Gauge.

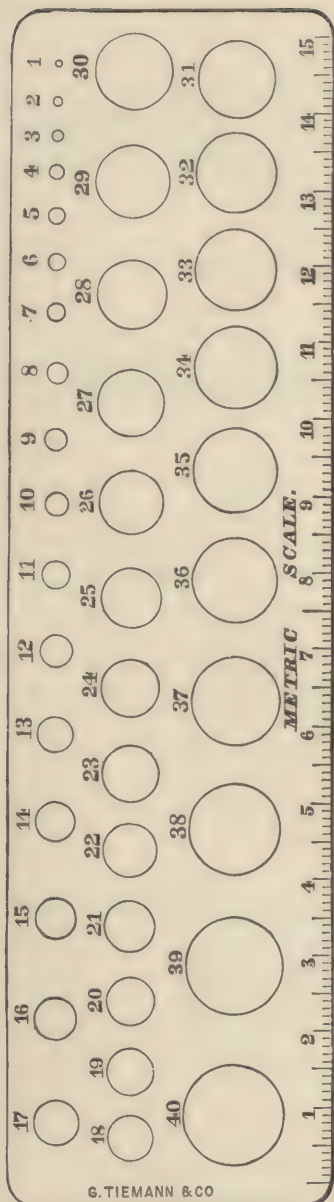


URETHRAL.

SCALES OR GAUGES.

For Grading the Sizes of Urethral Instruments.

FIG. 2848.
Metric Scale.



The Metric Scale.

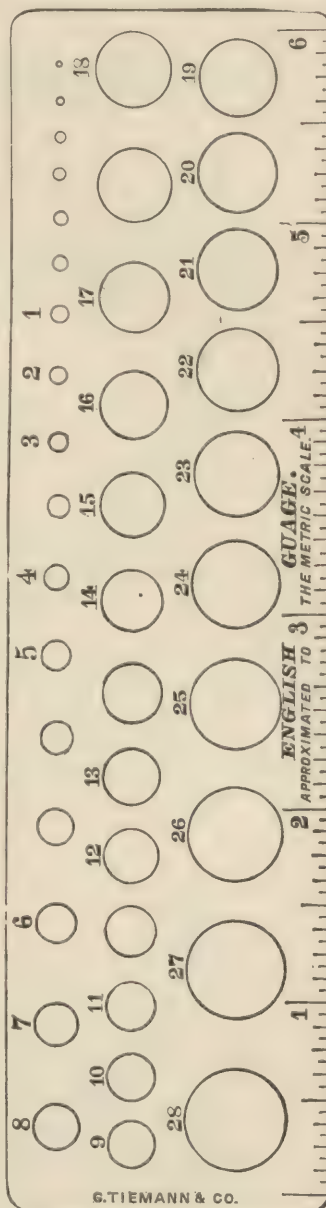
Enlarged from No. 30 to No. 40,
and sizes compared
to the
numbers of the English Gauge
by Dr. OTIS.

Dr. Otis claims, as an outcome of many experiments, that the human urethra varies much in its calibre in different persons. Hence an instrument that is of full size for one man may be either much too great or too small for another, and that the urethra is really *much wider* than is generally taught.

Dr. Otis has demonstrated, by a large number of measurements, that there is a proportionate relation between the circumference of the flaccid penis and the urethra of about 1 to $3\frac{1}{2}$.

"In a penis of 3 inches circumference the urethra would be 30 mm.; $3\frac{1}{4}$ in., 32 mm.; $3\frac{1}{2}$ in., 34 mm.; $3\frac{3}{4}$ in., 36 mm.; 4 in., 38 mm.; $4\frac{1}{4}$ to $4\frac{1}{2}$ in., 40 mm.; and that an estimate of calibre made on this basis is a valuable guide when the urethrometer is not available."—"Stricture of the Urethra: its Radical Cure." Fessenden N. Otis, M.D. 1878.

FIG. 2849.
Approximate English Numbers.

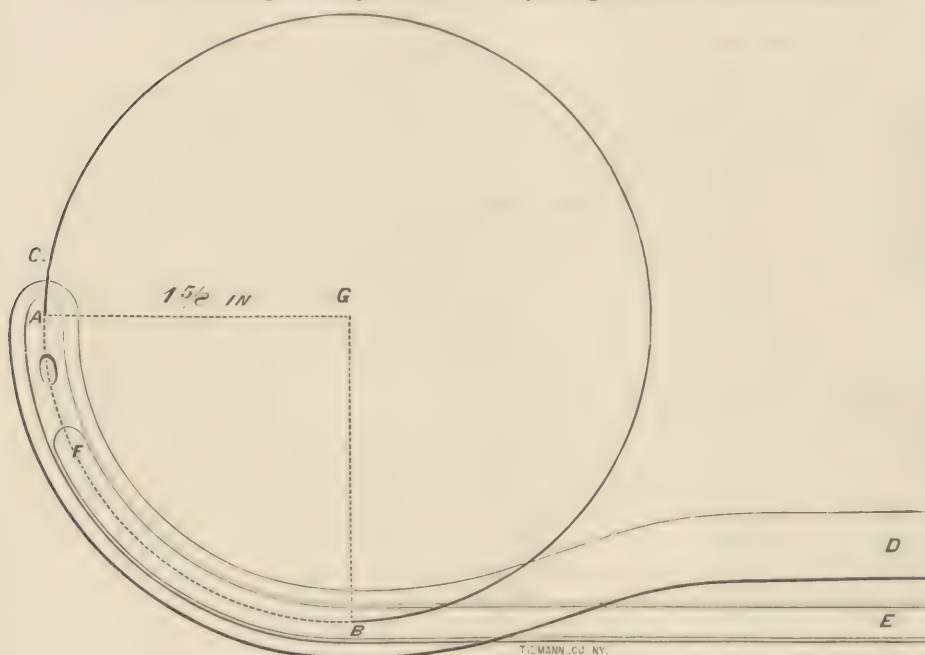


"Authorities concur, as a rule, in asserting that the meatus is the *narrowest portion of the urethral canal*, and yet this is usually accepted as a test of its calibre. This opening is subject to great natural variations in organs of about the same general proportions. The well-developed penis, in a dozen cases, may vary in regard to the size of the congenital meatus, from the calibre of No. 8 (or nine millimetres in circumference) to Nos. 32 or 34. It is important to recognize the fact that the meatus bears, necessarily, *no* proportion to the actual size of the urethra. If symptoms of stricture are present, such as persistent urethral discharge, &c., or if any chronic irritations of the genito-urinary apparatus present, the meatus should be freely incised and a thorough examination of the canal with the bulbous sound should be made."—"Stricture of the Urethra: its Radical Cure." Fessenden N. Otis, M.D. 1878.

URETHRAL.

Proper Curves for Male Urethral Instruments.

FIG. 2850.—Showing the Proper Curve for Unyielding Male Urethral Instruments.



Curve as recommended by Sir Henry Thompson, A. B. E. ; Dr. Van Buren, A. B. E. ; Dr. Gouley, A. B. E. ; Dr. Benique, C. B. D. ; Dr. Otis, F. B. E. ; Dr. Bumstead, F. B. E. See the works of these authors for particulars.

Prostatic catheters are now usually made with this curve, but with a longer beak.

"To Professor Van Buren is due the credit of having popularized, in New York, the excellent sounds curved after Thompson's model."—"Diseases of the Urinary Organs." Gouley. 1873.

Proper Conicity of Sounds.

FIG. 2851.—Gouley's Conical Steel Sound.



"* * * The principle, though an old one, and recommended more recently by Mr. Liston and other masters, does not seem to have been much applied ; neither do I know of any *methodical* or *definite conicity* being adapted for steel sounds before 1864, when I had mine made at Tiemann's. Ever since the year 1864 I have been using such sounds, made of smoothly polished steel. The point in each is three or four numbers (rarely more) smaller than the shaft, and the conicity occupies about one inch and a half. The length of the instrument, from the point to the junction of the shaft and handle, is nine inches. The handle, like the shaft, is smooth, and its edges have no angular projections, but all curved lines."—"Diseases of the Urinary Organs," page 27. Gouley. 1873.

All sounds are now nicely nickel-plated.

URETHRAL.

OCULAR INSPECTION.

Meatoscopes, Endoscopes, Urethroscopes, Specula, Dilators.

FIG. 2852.—Glass Meatoscope.

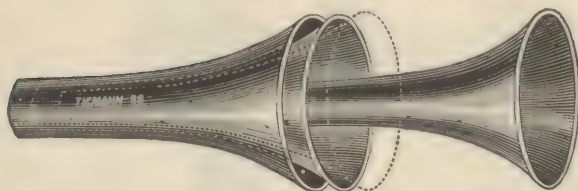


FIG. 2853.—Weir's Meatoscope.

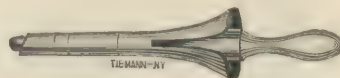


FIG. 2855.—Laveur's Endoscope.

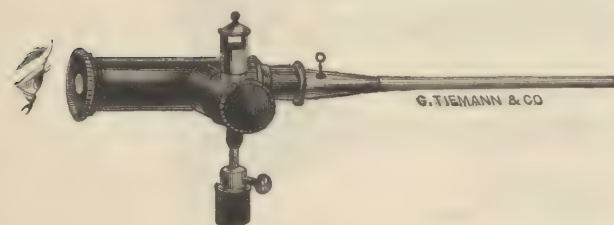
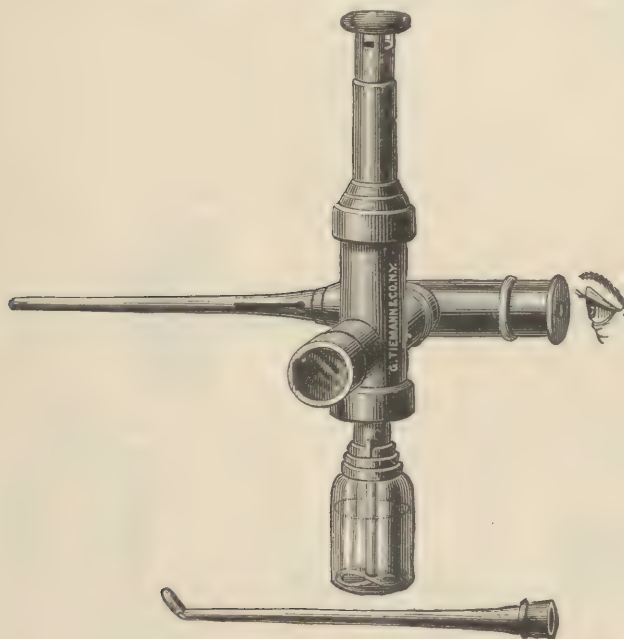


FIG. 2854.—Skene's Urethral Speculum.



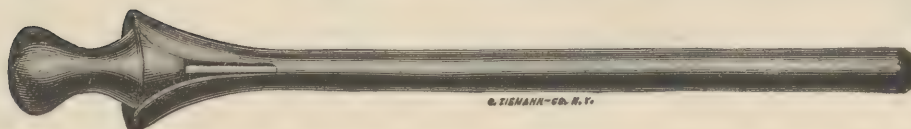
FIG. 2856.—Désormeau's Endoscope.



The endoscope is an instrument for ocular inspection of the urethra. Désormeau's endoscope and the various modifications of it consists of a series of metallic tubes, equal in calibre to Nos. 10, 12 and 14, about nine inches in length and open at both extremities, and of an illuminating apparatus. Being too expensive an instrument for general use it may well be replaced by the more simple urethroscopes. One of these was devised by Dr. Otis. This instrument, made of hard rubber, is very light, easily handled and causes little if any pain when in position; light reflected by means of a concave mirror from the sun, or from a modified student's lamp, being used for illumination (see page 257).

"For examining the deep urethra, however, the large instruments are decidedly preferable. To make a thorough inspection, the tube should be introduced well into the membranous urethra, the obturator withdrawn, the oil and mucus wiped away from the membrane presenting at the bottom of the tube, and then, the illumination being brought to bear, each successive portion of membrane may be inspected as the tube is withdrawn. The healthy mucous membrane has a pale pink color, and contrasts strongly with congested spots, which are of a vinous red without polish. Such spots can be plainly seen as they come across the end of the tube, and any granulations upon them are readily recognized by the practical eye.—"Genito-Urinary Diseases with Syphilis." Van Buren and Keyes.

FIG. 2857.—Otis' Endoscopic Tube.



URETHRAL.

OCULAR INSPECTION.

Meatoscopes, Endoscopes, Urethroscopes, Specula, Dilators.

FIG. 2858.—Auspitz's Urethroscope.

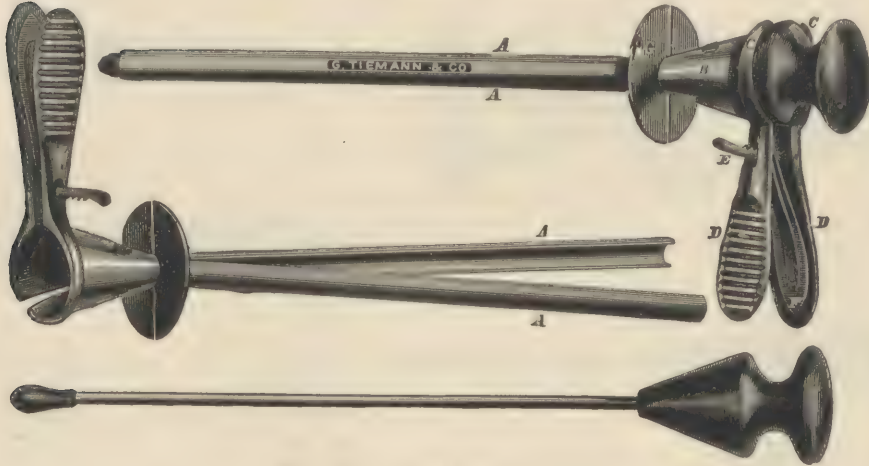


FIG. 2859.—Smith's Urethroscope.

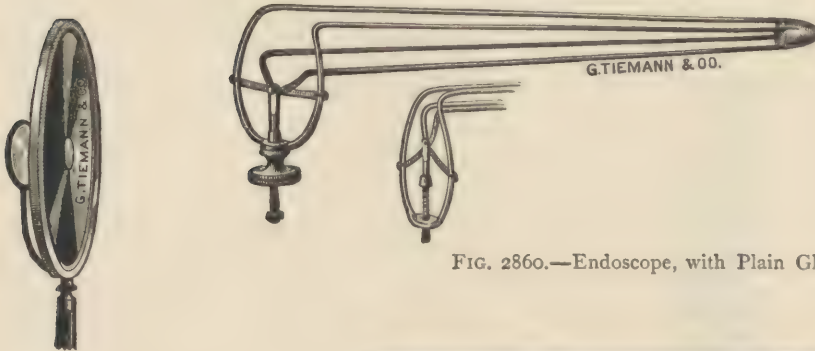


FIG. 2860.—Endoscope, with Plain Glass in front.

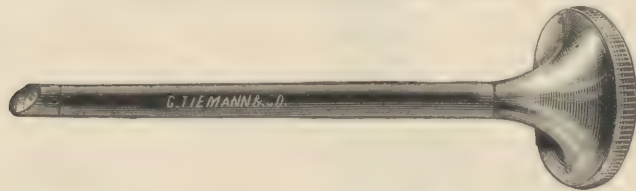


FIG. 2861.—Skene's Urethral Endoscope, for Inspecting the Female Urethra and Bladder.

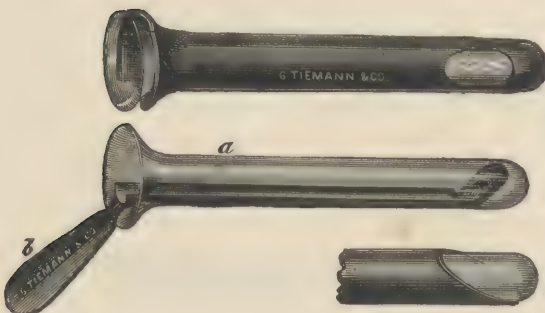


FIG. 2862. Skene's Folsom's Speculum.



FIG. 2863. Otis' Dilator.



URETHRAL STRICTURE.

EXPLORING.

Gum Elastic Bougies.

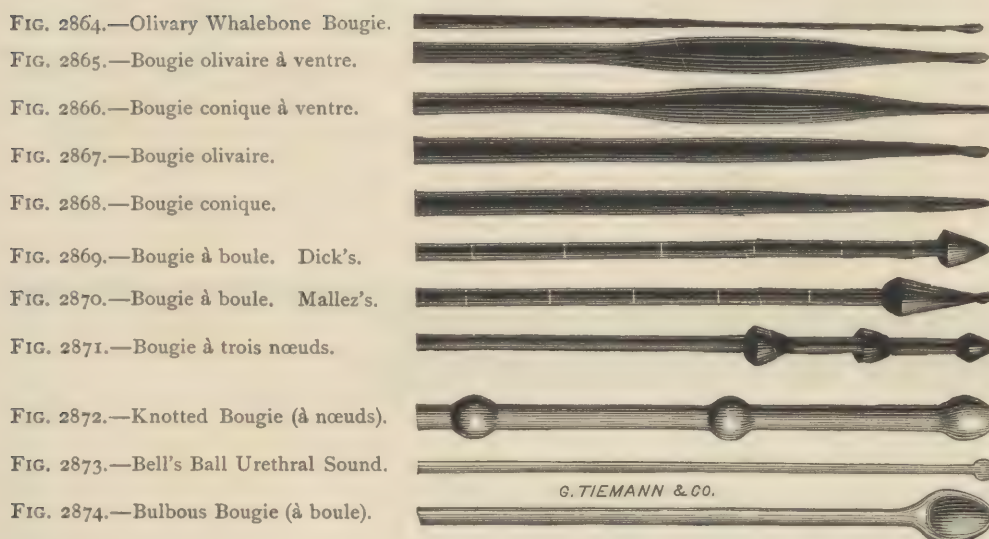


FIG. 2876.—Leroy d'Etiolle's Gum Filiform Bougies, Nos. 0, 1, 2.

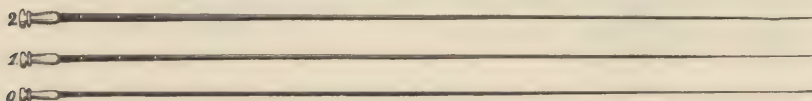


FIG. 2877.—Olivary Gum Elastic Catheter.



"The treatment of stricture, as well as its exact diagnosis, is, in the great majority of cases, carried on by the aid of instruments introduced into the urethra. All instruments of this exploring nature were, by the ancients, denominated *catheters*; the name is retained by the moderns, though with more restricted significations. In the United States and Great Britain the term is confined to the hollow evacuating instrument; the solid instrument is termed *sound*. The French word *bougie*, meaning, literally, a wax candle, has been adopted to cover all the varieties of flexible instruments.

"The *bougie à boule*, for diagnosing stricture, is used in the following manner: The penis is grasped by the left middle and ring fingers, while the thumb and index serve to retract the prepuce and separate the lips of the meatus; then an instrument as large as the orifice will easily admit, having been oiled, is slowly and gently introduced into the canal until it meets an obstacle which presents a positive hindrance to its further progress; the stem of the bougie should then be marked by the thumb-nail exactly at the meatus, and withdrawn and measured to ascertain the location of the stricture. The length of the stricture can be determined by using an instrument sufficiently small to pass through and beyond the obstacle. This bougie should then be pushed onward in search of other impediments, until it has reached the bladder, where it may be retained a moment, and then slowly withdrawn till the base of the olive presents at the vesical extremity of the constriction. If the measuring above directed be now repeated, and the first measurement, *plus* the length of the smaller bulb, be deducted from the second measurement, there will remain the length of the stricture."—"Diseases of the Urinary Organs." Gouley.

URETHRAL STRICTURE.

EXPLORING.

FIG. 2878.
Points of Gouley's
Whalebone Guides.



"Though the soft filiform bougie of Leroy d'Etiolles answers well in many cases, I have often verified the fact that the instrument coiled in front of a stricture and sometimes doubled itself, so that the point appeared at the meatus when it was believed to have passed into the bladder. For these reasons I have for many years used in their stead slender, probe-pointed shafts of whalebone, which are less liable to coil in the urethra, adapt themselves admirably to the inflections of the canal, can be made as thin as a horse-hair, and will still retain sufficient strength to enter the narrowest stricture."—"Diseases of the Urinary Organs." Gouley. 1873.

Gouley's Whalebone Guides are especially designated to be used with his Tunnelated Instruments, of which they form a *sine qua non*; see next page.

FIG. 2879.—Hunter's Filamentous Wedge.

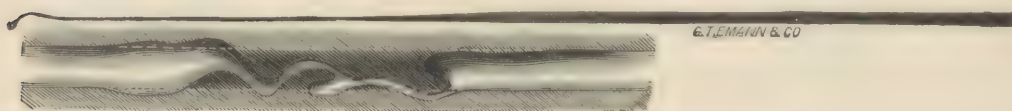


FIG. 2880.—Bank's Whalebone Bougies.

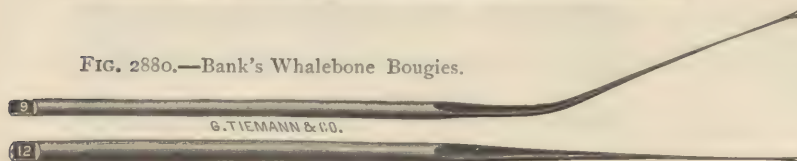
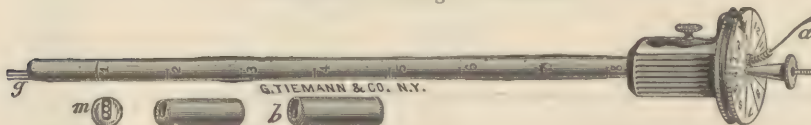


FIG. 2881.—Eldridge's Pathfinder.



A bougie-like instrument having five passages extending through its entire length; it is introduced into the urethra up to the stricture. Filiform bougies are then passed through any of the holes, and may be withdrawn any number of times or introduced through different holes until one of them enters the bladder, when the others are withdrawn and the instrument advanced upon the one *in situ*.

FIG. 2882.—Tiemann's Eldridge's Pathfinder.



FIG. 2883.—Gross' Urethrometer.

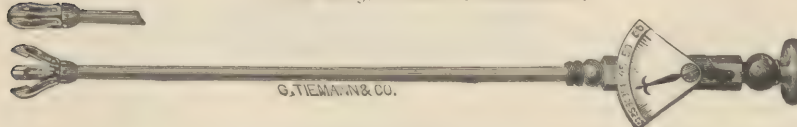


FIG. 2884.—Weir's Urethrometer.

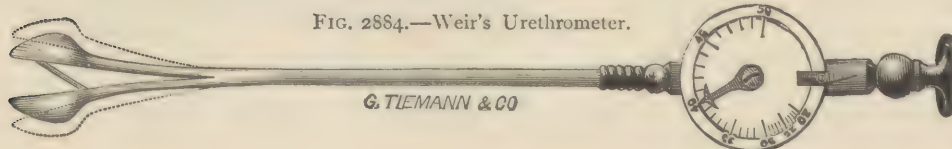
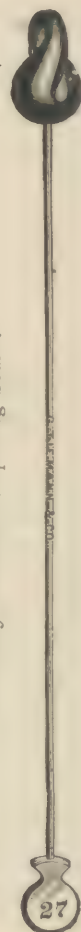


FIG. 2885.—Warren's Exploring Sound.



URETHRAL STRICTURE.

EXPLORING.

FIG. 2886.—Otis' Metallic Bougie à boule. (Nos. 8 to 40 constitute a full set.)

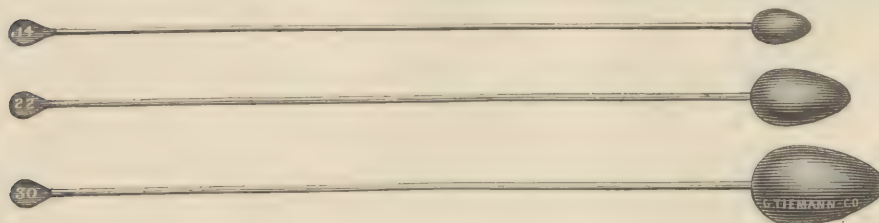


FIG. 2887.—Civiale's Bistoury Caché.



FIG. 2888.—Gouley's Meatotome.



FIG. 2889.—Mitchell's Meatotome.

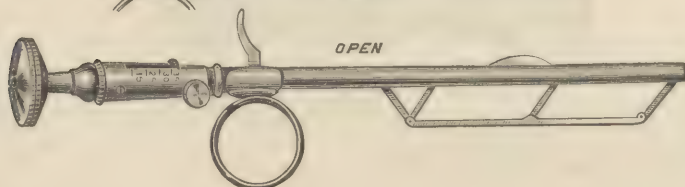


FIG. 2890.—Piffard's Fossal Stricture Knife.



Strictures at or near the meatus may be divided by any of the above instruments. According to authors the cut is always to be made downwards, or on the floor of the urethra, and the enlarged opening subsequently tested with a bougie à boule, to ascertain if it be of sufficient size.

FIG. 2891.—Otis' Meatotome.



FIG. 2892.—Piffard's Meatotome.



FIG. 2894.—Piffard's Meatometer.



FIG. 2893.—Piffard's Fossal Bougie à boule.



URETHRAL STRICTURE.

EXPLORING.

FIG. 2895.—Gouley's Tunnelled Catheter.

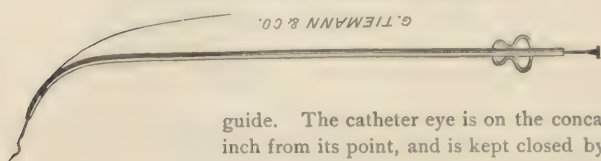


FIG. 2896.
Points of Gouley's
Whalebone Guides.



It is three millimetres in diameter, conical, its point being two millimetres. A groove on its convex side extends a distance of four inches, and is bridged over in its last twelfth of an inch, so as to form a tunnel for the reception of a whalebone

guide. The catheter eye is on the concave side of the instrument, about three-fourths of an inch from its point, and is kept closed by a well fitted stylet.

The whalebone guides or probe-pointed conductors are of the length of the ordinary gum bougies, and half a millimetre in diameter. Some are straight, some spiral and some angular pointed (as indicated by Fig. 2896); a dozen of these should be in your case of instruments. One of these is introduced into the urethra; if it enters a false passage, it is retained *in situ* by the left hand, while another is passed by its side. If this second guide makes its way into the false passage, it is to be treated precisely as was the first, and the operation repeated till one guide can be made to pass the obstruction and enter the bladder; the others are then removed. Now, if the free end of the guide bougie, which occupies the whole length of the urethra, be passed through the tunnel or canal of the catheter and the instrument made to advance, it must follow the guide. When its point comes in contact with the face of the stricture it will be held there firmly, but no force must be used; in a few moments it will probably pass the stricture and enter the bladder.

FIG. 2897.—Thompson's Retention Catheter, with Malleable Silver Probe Points.

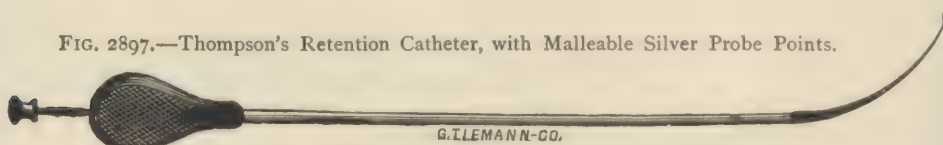
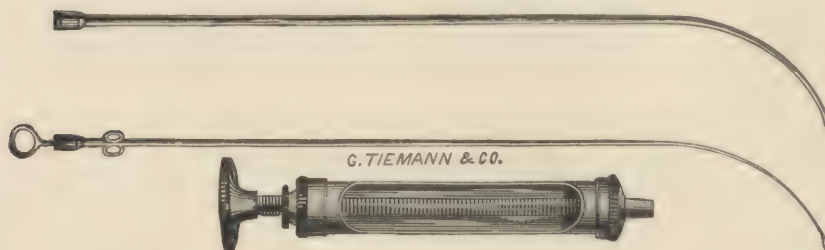


FIG. 2898.—Otis' Dilating Catheter and Syringe.

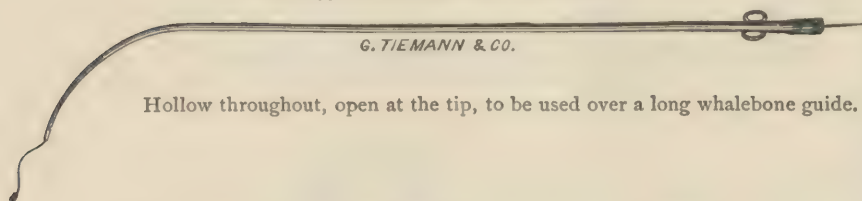


"With the view of affording aid in the preparatory dilatation of strictures too small to admit the necessary instrument for immediate operation I have designed the accompanying modification of Sir Henry Thompson's probe-pointed catheter. It consists simply of a fine probe-pointed silver tube, eleven inches in length and three millimetres in circumference at its point, gradually increasing in size, so that at six inches it is six millimetres. The tube is traversed by a steel stylet throughout its length. Carefully insinuated through close stricture, by the aid of a finger in the rectum, until its point may be supposed to have reached the bladder, the stylet is removed and a small syringe is applied to its proximal opening. If the instrument has passed the *sphincter vesicae*, on a withdrawal of the piston, the urine will appear in the barrel of the syringe. The instrument may then be confidently pressed onward until the stricture is dilated to the largest capacity of the tube; a second tube, of corresponding form, but with dimensions ranging from four millimetres at the point to eight millimetres, may then be similarly used. In cases where, on account of the extreme closeness of the stricture or from its divergent or tortuous course, a difficulty in passing the instrument occurs, Dr. Gouley's whalebone guide bougies will prove serviceable. These are used as in his grooved canulated staff, viz.: by the previous introduction of the guide-bougie into the bladder, threading the dilating catheter upon it and following it down through the stricture. Succeeding in this manoeuvre, the guide-bougie may be removed, the presence of the dilating catheter in the bladder tested by the aid of the syringe, the stylet introduced and the stricture dilated, as previously described. The whalebone guide-bougies, to be used in this manner, require to be from sixteen to eighteen inches in length. They are easily made of any desired length and fineness, and, by passing them through the flame of an alcohol lamp, may be moulded at the extremity to any curve or angle deemed most likely to adapt itself to the eccentricity of the stricture."—"Stricture of the Urethra: Its Radical Cure." Fessenden N. Otis, M. D.

URETHRAL STRICTURE.

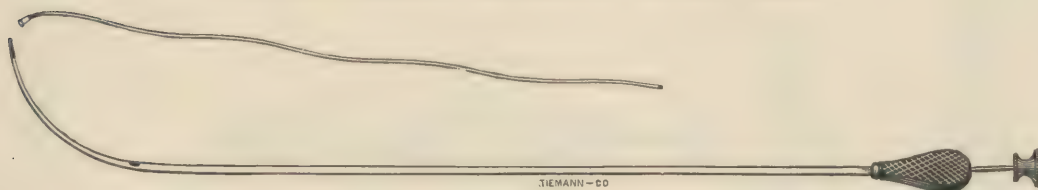
EXPLORING.

FIG. 2899.—Otis' Retention Cathether.



Hollow throughout, open at the tip, to be used over a long whalebone guide.

FIG. 2900.—Bumstead's Modification of Thompson's Catheter.



METHODS OF TREATMENT.

The surgical methods of treating stricture are: Direct *applications* to the diseased surface, pressure and overdistention by sounds—*dilatation*, forcible rupture—*divulsion*, and *internal urethrotomy* and *external perineal urethrotomy*.

"Pressure and over-distention by large sounds, and direct applications of various chemical agents (see "SYRINGES and APPLICATORS") to the diseased surface, are used in the formative period. In fully developed stricture, *dilatation* is usually tried first; if it fails, *divulsion* is employed, except in obstinate constrictions of the pendulous portion and those near the external orifice, in which *internal urethrotomy* should be performed. *External perineal urethrotomy* is demanded in severe contusions of the perinæum, where the urethra is torn across; in narrow unyielding traumatic strictures; in narrow resilient and in impassable strictures with retention of urine; and also for the relief of bad cases complicated with obstinate urinary fistulæ."—"Diseases of the Urinary Organs." Gouley.

"The instruments which it is necessary for the surgeon to possess in order to be able to meet the requirements of all cases of stricture are: different varieties of bougies, sounds, catheters, a catheter gauge; instruments for *divulsion*, *internal* and *external urethrotomy*: trocars, canulæ and an aspirator."—"Genito-Urinary Diseases." Van Buren and Keyes.

Injecting the Urethra.

FIG. 2901.—Otis' Syringe Nozzle.



"A very general impression exists in the profession that fluids are with difficulty injected into the deeper parts of the urethra by an ordinary syringe, and that to force them into the bladder by that means is a physical impossibility. Within the past two years I have had three patients who were able to inject their respective bladders by means of an

ordinary Davidson syringe, one of them throwing in a pint of water in my presence, then emptying the viscus, refilling and discharging it in succession. I am therefore convinced that it is judicious to *limit the distance* we desire to medicate by pressure on the canal at a given point; and I also believe that the whole diseased surface can usually be reached by a properly constructed syringe of ordinary size. After directing the patient to pass his water (for the purpose of cleansing the canal), the medicated fluid should be thrown in quickly, to avoid spasmodic resistance, filling the urethra to the desired limit, and allowing it to remain for from one to three or four minutes. This procedure I am accustomed to have repeated three or four times in the twenty-four hours. If, notwithstanding the use of injections administered after the manner I have indicated, the discharge still continues, though in decreased quantity, no other cause of failure appearing prominent, I am led to infer that the medicating fluid does not reach all points of the diseased surface; that, from insufficient distention of the canal, portions between the folds of the membrane, or in the sulci of some of the numerous follicles with which the urethral lining is studded, have escaped the topical application. For security against failure, I am accustomed to introduce the injection through a modification of the ordinary syringe, as represented in the cut. By means of this instrument the urethra is penetrated to the farthestmost point of disease, distended to its full capacity and thoroughly bathed with the contained fluid."—"Stricture of the Male Urethra." F. N. Otis, M. D. 1878.

URETHRAL STRICTURE.

SYRINGES AND APPLICATORS.

FIG. 2902.—Buttle's Gonorrhoea Syringe.

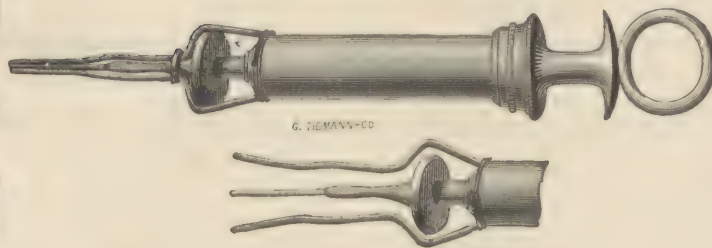


FIG. 2903.—Wheelock's Reverse-Flow Syringe.



FIG. 2904.—Sigismund's P. P. Syringe.



FIG. 2908.—Brown's (F. Tilden) Syringe and Applicator.

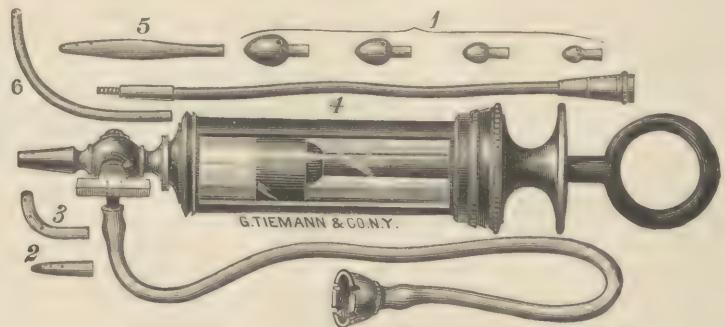


FIG. 2909.—Utzmann's Deep Urethral Syringe.



FIG. 2910.—Bumstead's Urethral Syringe.

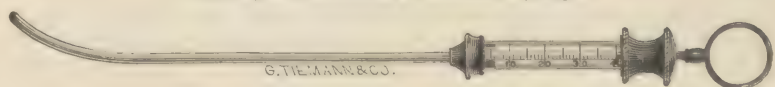


FIG. 2905.—Hard Rubber P. P. Syringe.



FIG. 2906.—Bumstead's P. P. Syringe.



FIG. 2907.—Long Pipe Urethral Syringe.

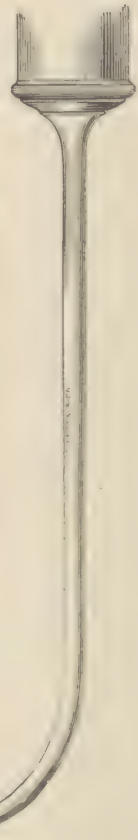
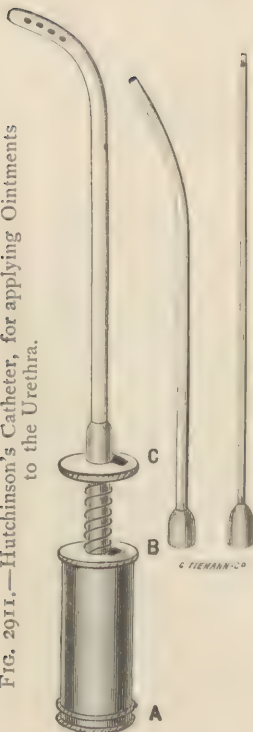


FIG. 2911.—Hutchinson's Catheter, for applying Ointments to the Urethra.



URETHRAL STRICTURE.

SYRINGES AND APPLICATORS.

FIG. 2912.—Lallemand's Porte Caustique.

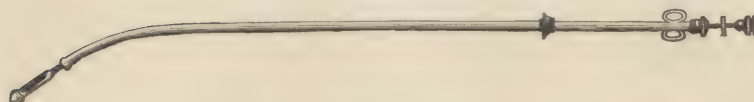


FIG. 2913.—Reginald Harrison's Pessary Catheter.

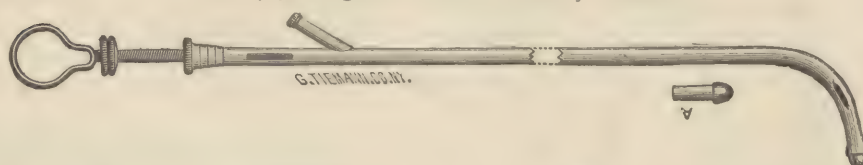


FIG. 2914.—Dick's Caustic Syringe.

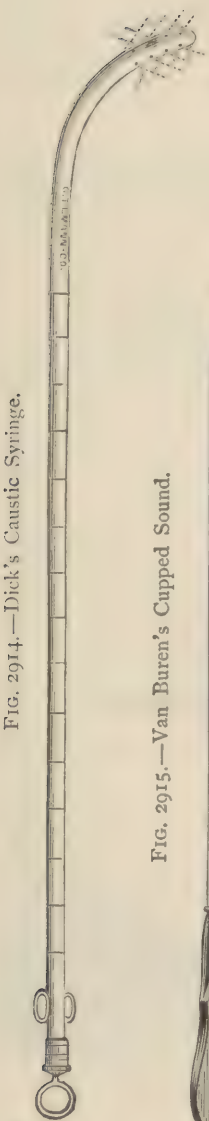


FIG. 2915.—Van Buren's Cupped Sound.

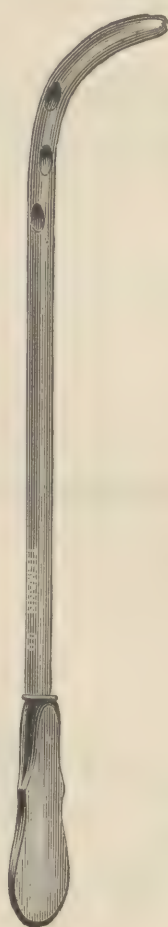


FIG. 2916.—Ointment Bougie.

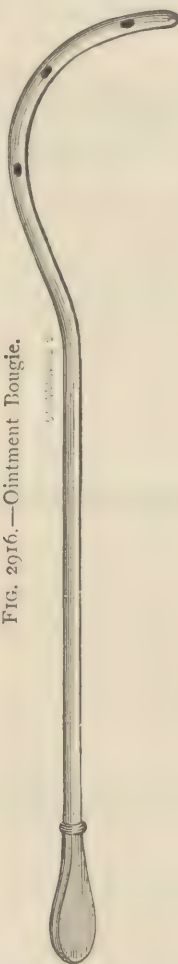


FIG. 2917.—Bryce's Urethral Applicator, for Ointment.



FIG. 2918.—Caspar's Ointment Bougie, modified by Tiemann & Co.

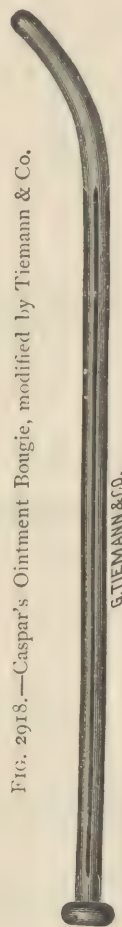


FIG. 2919.—Mallez's Powder Insufflator.

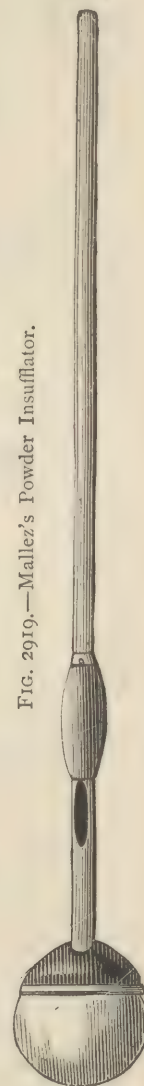
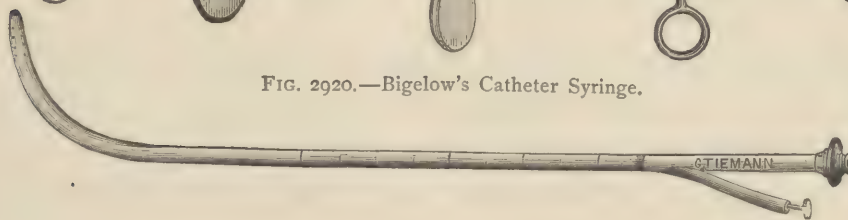


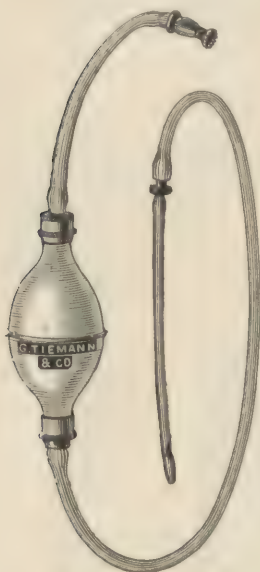
FIG. 2920.—Bigelow's Catheter Syringe.



URETHRAL STRICTURE.

SYRINGES AND APPLICATORS.

FIG. 2921.—Harrison's Urethral Irrigator.



"The catheter should be six inches in length, and be completely passed into the urethra, merely allowing room for the connection with the syringe pipe. The catheter should not be larger than a No. 6, English gauge, so as to allow plenty of room between it and the walls of the urethra, in which the injected fluid can circulate. The eye in the catheter should not be too near the end, nor too large, and its edge should be beveled so as not to scrape the urethra. For smoothness in introduction, Tiemann's (of New York) velvet-eyed india rubber catheters are a great improvement on the English make, where the eye of the instrument is punched out without being beveled."—Reginald Harrison, F. R. C. S., Surgeon to the Liverpool Royal Infirmary.

FIG. 2922.—Thornton Parker's Urethral Tube.

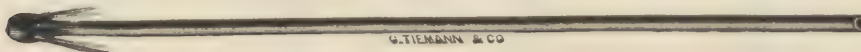


To remove some of the difficulties encountered at present in the treatment of urethral inflammation, and to facilitate the injection of the urethra without pain, Messrs. George Tiemann & Co., of New York, have made some "soft rubber, velvet-eyed tubes with bulbs, for making the injection painless."

The accompanying woodcut gives a very good idea of the tubes.

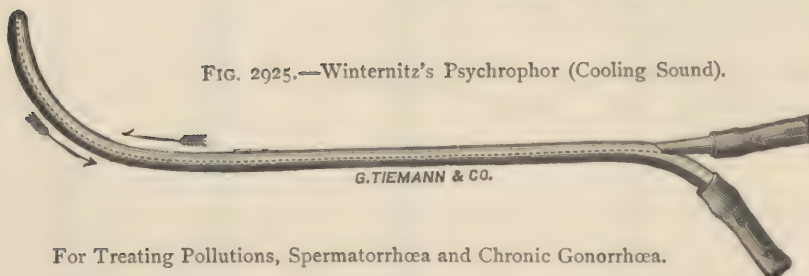
They are about two and a half inches long, of three sizes, the bulbs corresponding with Nos. 13, 15 and 17, American scale. They are made of pure rubber, soft and pliable. They fit easily on the nozzle of almost any syringe.

FIG. 2923.—Mitchell's Reflux Catheter, with Tiemann & Co.'s Soft Rubber Velvet Eye.



Application of Cold.

FIG. 2925.—Winternitz's Psychrophor (Cooling Sound).



For Treating Pollutions, Spermatorrhœa and Chronic Gonorrhœa.

FIG. 2924.
Spermatorrhœa Ring.



"A double current catheter without eyes, the two canals communicating near the point of the instrument. It is introduced into the urethra until its point has passed the pars prostatica, and it is then attached by rubber tubing to a reservoir containing water of the desired temperature. On turning the stopcock, the water flows into one canal and out through the other. In this way the caput callinaginis and the entire mucous membrane are exposed to the mechanical action of pressure and the *sedative action of cold*."

Fig. 2924 is for the purpose of preventing nocturnal involuntary emissions of semen—the teeth of the ring causing pain as soon as an erection occurs and awakening the patient. See "ELECTRODES FOR THE URETHRA," page 34.

URETHRAL STRICTURE.

GRADUAL DILATATION, PRESSURE AND OVER-DISTENTION.

Dilators.

Dilators have been made of various substances, susceptible of considerable expansion by moisture, such as catgut, slippery-elm bark, laminaria digitata, &c. These instruments, when introduced into the urethra and left *in situ*, would be expanded by the secretions. They were sometimes painful, and their withdrawal endangered the urethra. They are now rarely used.

Bougies and Sounds.

The French word *bougie*, meaning literally a wax candle, has been adopted to cover all varieties of flexible dilators; those made of metal are termed sounds. (See page 345 for other forms of bougies.)

FIG. 2926.—Cylindrical Gum Bougie.



FIG. 2927.—Olivary Gum Bougie.



Of the modern flexible gum bougies Dr. Gouley says: "Their great advantage is, that anybody can introduce them; there is ordinarily no great skill needed and no danger to be apprehended of lacerating the mucous membrane. They are the safest instruments in the hands of beginners. In my own practice I use the gum bougies almost exclusively up to No. 7. I have no ordinary steel sounds smaller than No. 7; but, having reached that number, I usually set aside the elastic instruments to use the smoothly polished *conical steel sounds*."

FIG. 2928.—Van Derveer's Bougie.



"Having had such excellent results from the use of the instrument illustrated by the accompanying cut, I feel it proper to call the attention of the profession to it. In the treatment of urethral stricture by gradual dilatation, and in those cases where it became necessary to maintain the calibre of the urethra after internal urethrotomy, or rapid divulsion, I have realized for a long time that the fixed curve of the steel sound gave unnecessary pain, and that the soft, olive-pointed bougie, by passing some two or more inches further into the bladder than was required, gave to that organ a shock and an irritation which, in addition to being very disagreeable to the patient, incurred also the dangers of possible cystitis, with its complications.

"Acting upon the knowledge of the fact that we seldom, if ever, meet with a stricture in the prostatic portion of the urethra, I had made, some two years ago, by Messrs. Tiemann & Co., light metal urethral dilators, of the average length of the spongy and membranous portion of the urethra—about eight inches—and in size ranging from Nos. 10 to 42 of the French scale. These were found very serviceable, being used by patients with safety and success. Later, as an improvement on the above described instrument, I had made, in different sizes, the solid rubber urethral bougie, which gives the least possible pain on passing. These bougies were also made by Tiemann & Co., who are now prepared to furnish them singly or in sets. Believing them to be the safest of all bougies, and knowing from actual use that they are the most serviceable, I present them with confidence to those of my brethren who have these cases, in the treatment of which such an instrument is indicated."—A. Van Derveer, M. D., in *Medical Record*, Dec. 3, 1881.

FIG. 2929.—Straight Conical Steel Sound.



"Stricture in the pendulous part of the urethra may be kept dilated with a straight steel sound of proper size, very little conical, and not over five inches long."—Van Buren.

"In order to insure success the dilatation should be continued until the size of No. 12 or 14 is found to pass without resistance. The patient may then be considered cured, so far as a cure is possible in these cases, for it must be understood that in whatever manner the relief of the stricture has been effected, whether by dilatation or by rupture, by caustic or incision, the result is the same—the stricture will inevitably return unless the use of instruments is continued."—"Principles and Practice of Surgery." Hamilton.

URETHRAL STRICTURE.

GRADUAL DILATATION.

Conical Steel Sound.

"If patients applied for relief in the earlier stages of the disease cutting operations would seldom be required. It is best to begin with the systematic use of conical steel sounds, gradually increasing the number to the full capacity of the meatus; introducing but one instrument every second or third day—never sooner than the second day—and then allowing it to remain *in situ* for a single minute to make pressure upon the granular surface. Ever since the year 1864, when I had mine made by Tiemann & Co., I have been using such sounds, made of smoothly polished steel. The point in each is three or four numbers (rarely more) smaller than the shaft, and the conicity occupies about one inch and a half. The length of the instrument, from the point to the junction of the shaft and handle, is nine inches. The handle, like the shaft, is smooth, and its edges have no angular projections, but all curved lines. The smallest instrument constructed on this plan is five millimetres in diameter at the shaft—about No. 7 English—the largest No. 20. Upon one side of the handle the number is stamped, the diameter upon the other."—"Diseases of the Urinary Organs." Gouley. 1873.

"The most necessary instrument for the treatment of stricture is the steel sound; for, whatever means be used to cure the stricture, rarely can the cure be maintained without the help of the sound. The *short* curved steel instruments, at first made *blunt*, I had subsequently finished with slightly conical extremities. The old instruments which they replaced were made of heavy wire with *long rediculus curves*, constantly varying, so awkward that they were rarely employed, *bougies* being generally preferred. These are numbered according to American and French scales."—"Genito-Urinary Diseases with Syphilis." Van Buren and Keyes. 1874.

"All other modes of enlarging the canal are only preliminary steps to the application of *proper dilators*—which are *bougies and sounds*; for, after divulsion and the urethrotomies, the dilators must always be used to ensure calibration and permanent relief."—"Diseases of the Urinary Organs," p. 47. Gouley. 1873.

FIG. 2930.—Conical Steel Sound.



FIG. 2931.—Teft's Sound, for Strictures exteriorly to the triangular ligament.

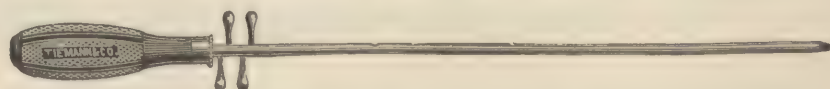


See *Medical Record*,
Jan. 23, 1886.

FIG. 2932.—Burge's Curved Stricture Dilator, Metal.



FIG. 2933.—Burge's Straight Dilator.



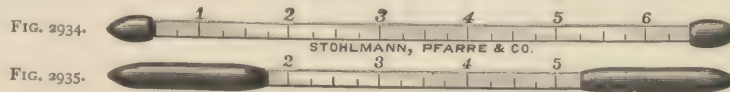
Dr. Burge's dilators (Figs. 2932, 2933) consist of four different sizes of tubes, all telescoping on the smaller. *Modus operandi*: The tubes are all drawn in, so that the point of the instrument appears rounded like the ordinary sound. It is then well oiled and introduced into the urethra until it meets with the obstruction; the inner or smallest of the tubes is then pushed forward. After it has entered the orifice of the stricture the tubes next in size are forwarded progressively.

URETHRAL STRICTURE.

GRADUAL DILATATION.

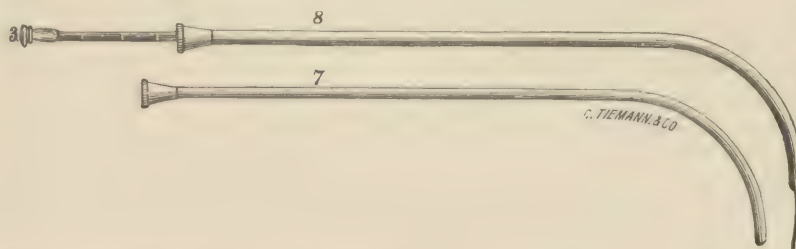
FIG. 2934.—Weisse's Bougie à Boule, with non-flexible, ruled staff.

FIG. 2935.—Weisse's Urethral Sound, for treating strictures of the male urethra exteriorly to the triangular ligament.



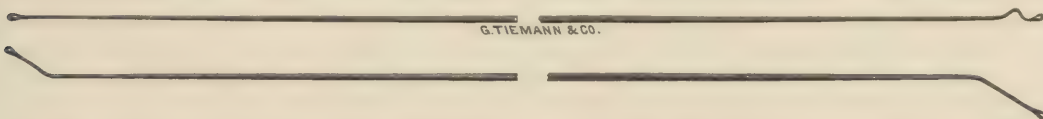
"The *sound portion* at either end is two inches in length; the middle, for an inch, represents the full circumference, or *size* of the sound, in millimetres; the ends, for half an inch each, taper through several sizes. The *staff portion* has much less circumference and is four and a quarter inches in length; it is flattened on two sides (one for each of the end sounds), which are ruled in inches, with quarter inch divisions."—Faneuil D. Weisse, M. D., *Medical Record*, December 20, 1884.

FIG. 2936.—Minor's Dilators.



"Minor's dilators (Fig. 2936) consist of metallic catheters or tubes, open at both ends, the one at the vesical extremity well rounded. They are introduced over a filiform gum bougie, which serves as a guide for them. They may be used as stricture dilators, and also for evacuating the bladder of urine.

FIG. 2937-38.—Gouley's Whalebone Bougies, for Catheterism of Eccentric and Tortuous Strictures



"I have, for many years, used slender probe-pointed shafts of whalebone, which possess great advantage over both the French and English capillary gum bougies, being more elastic than either of the latter, and less liable to coil in the urethra, while they adapt themselves admirably to the inflections of the canal, and can be made so small as to enter the narrowest constrictions. The size mostly in use is two-thirds of a millimetre in the shaft, the next is half a millimetre; they can, however, be reduced to the size of a horsehair, and still be sufficiently strong. They are ordinarily twelve inches long, but I have had some made of double that length.

"*Mode of using them.*—Being very slender, they cannot be properly oiled; it is therefore better to fill the urethra with warm benzoated olive oil; then, if the stricture be eccentric, an angular bougie is to be introduced, with the point directed towards the floor of the canal in order to avoid its entering the *lacuna magna*. The direction of the point may be changed as soon as it has gone beyond the lacuna, but should it then enter another lacuna it must be slightly withdrawn, turned aside, and carried onward until it meets the final obstruction. From this moment it becomes an explorer in search of the orifice of the stricture, to find which is not, as has been asserted, "a mere matter of chance," but a procedure requiring very light fingers with great delicacy of touch, and much experience and skill. To be sure of entering the mouth of a narrow eccentric stricture, the point of the bougie should be kept in contact with the urethral wall, while a slight to and fro movement is given the instrument until the stricture is entered or the whole circumference of the canal is explored. The instrument is bent at both ends in exactly opposite directions, that the distal may indicate the position of the vesical extremity, and consequently the situation of the orifice of the stricture.

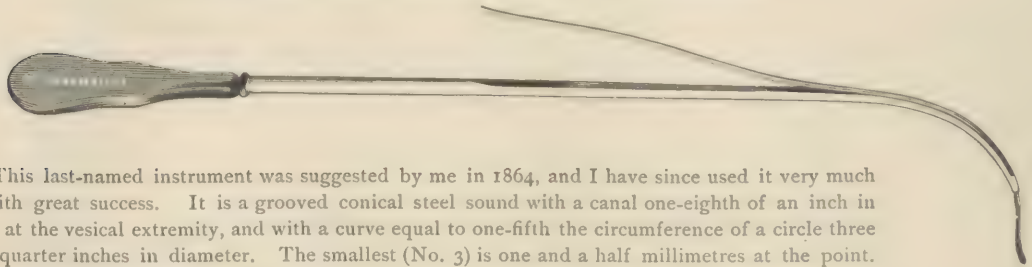
"After the bougie has been passed through the stricture it should be movable back and forth; otherwise it is almost certain that the point is caught in one of Cowper's ducts, in one of the many enlarged lacunæ in the ampulla behind the stricture in the utriculus, or in one of the ejaculatory ducts. At this stage of the proceeding it is necessary to exercise much caution and gentleness in disengaging the instrument from its faulty position, as an undue force will give rise to a false passage, or excite inflammatory action which may extend to Cowper's gland or to the testicle. By withdrawing the instrument a quarter of an inch, or even less, and giving it a slight rotary movement

URETHRAL STRICTURE.

GRADUAL DILATATION AND OVER-DISTENTION. (Continued.)

to change the direction of the point, and then pushing it gently onward, the obstacle will be surmounted and the bladder entered. Having reached the bladder, the bougie (Fig. 2937-38) serves as a conductor upon which a peculiarly constructed sound is made to glide and dilate the canal, and also straighten it if the stricture happens to be tortuous.

FIG. 2939.—Gouley's Tunnelled Sound (and Guide).



"This last-named instrument was suggested by me in 1864, and I have since used it very much and with great success. It is a grooved conical steel sound with a canal one-eighth of an inch in length at the vesical extremity, and with a curve equal to one-fifth the circumference of a circle three and a quarter inches in diameter. The smallest (No. 3) is one and a half millimetres at the point. I have had larger ones made (to No. 15), to fully dilate strictures complicated with false passages, and have named them *tunnelled sounds*."—"Diseases of the Urinary Organs." Gouley.

"When a capillary whalebone guide has passed through a tortuous or an eccentric stricture and has entered the bladder, the free end is slipped through the tunnel of the smallest sound, which is carried down to the obstacle, held in firm contact with it—precaution being taken to keep the guide in the groove of the staff—and in a few moments the instrument will pass, but no force or undue pressure should be used. It is desirable, after having accomplished this much, to carry on dilatation rapidly, at the same sitting, to four or five higher numbers, to guard against the possibility of retention of urine from too great inflammatory swelling. The stricture should then be treated by gradual dilatation, and no other method thought of, unless dilatation fails after a thorough trial."—"Diseases of the Urinary Organs." Gouley.

Extent to which a Stricture should be Dilated.

"It is often said that if a No. 10 or 12 instrument is passed into a man's bladder he cannot have stricture; this is a very common error into which too many intelligent practitioners have fallen. * * * The introduction of a No. 12 may cause extreme over-distention in some cases, while in others it may not make the slightest impression upon the urethra, which may require distention to No. 20 or 22 at the seat of disease.

"The normal average in the narrowest part of the urethra, *i. e.*, the meatus, is equal to No. 14; but, even then, a stricture in its formative period may exist in the canal, and still admit No. 14, and escape detection unless proper means be taken for its discovery. Another man's urethra may admit No. 16, 17, or even 18, and be constricted. The extent, then, to which dilatation is to be carried should depend upon the normal calibre of the canal in each individual case."—"Diseases of the Urinary Organs." Gouley. 1873.

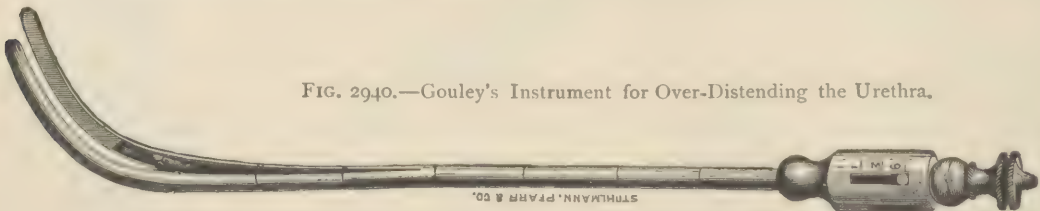


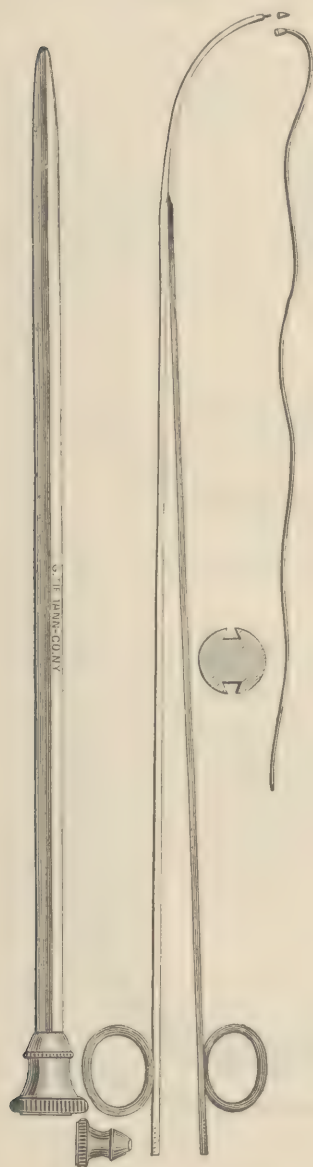
FIG. 2940.—Gouley's Instrument for Over-Distending the Urethra.

"If the meatus will admit no larger sound than No. 16, the two-bladed dilator, which I have devised for the purpose of greatly over-distending the canal at the diseased point, in such cases, does good service. Its two blades are not joined at the vesical end, and are, at that point, so thin and yielding that they cannot act injuriously upon the parts behind the diseased portion of the urethra. The calibre of the shaft is equal to No. 10, and the instrument is really a curved hollow conical sound, split longitudinally so that the two blades are separated laterally by a lever attached to a rod, which is moved by a screw in the handle, and when fully expanded the widest part more than equals in circumference the sound No. 20. It is graduated in inches, so that the part susceptible of greatest expansion can be made to act on the urethra exactly where it needs to be over-distended. This dilator may be used to distend the canal very gradually, or may be made to act as a divulsor by rapidly turning the screw and opening the blades to their greatest extent."—"Diseases of the Urinary Organs." Gouley.

URETHRAL STRICTURE.

RAPID DILATATION AND DIVULSION.

FIG. 2941.—Voillemiér's Stricture Divulsor.



"To treat a stricture by divulsion is to make a longitudinal rent of the constricted portion of the urethra. This may be accomplished by the successive introduction of conical sounds—which act on the principle of the wedge—beginning with small ones, or by any of the various divulsors, improperly called dilators, which are now in use. These are Perrère's instrument, and its modifications by Holt, Richardson, Voillemiér, Michélena and Sir Henry Thompson's and their modifications. The method of treatment by divulsion is more thoroughly understood and appreciated in our time than when the early "dilators" were brought into notice.

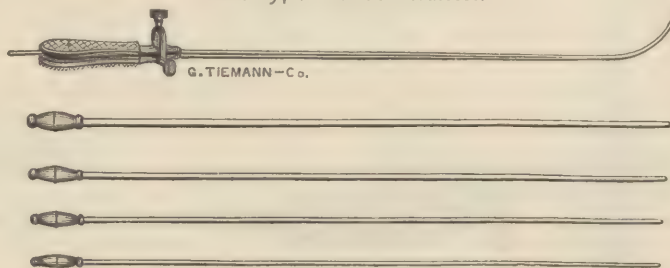
"In 1847 appeared Dr. Michélena's thesis on stricture, with a description and engraving of a "dilator," consisting of two blades, free at the extremity and acted upon by a series of levers. In 1849 Mr. Rigaud published, in the *Gazette Médicale de Strasbourg*, a description of a similar instrument, and the two are sometimes confounded. In Mr. Rigaud's dilator the blades slide upon each other while they are being opened, but in that of Dr. Michélena they preserve their parallelism."—"Diseases of the Urinary Organs." Gouley.

Voillemiér's instrument consists of two slender blades, between which rods of different sizes are introduced, according to the degree of dilatation the operator intends to make. The rods are grooved in such a manner that they are retained in position and cannot travel off the blades. Either the cap may be screwed on to the point or the long delicate conducting gum filiform bougie attached, which is intended to penetrate very close strictures complicated with false routes.

"When one of these filiform bougies has been made to penetrate a stricture, some other instrument, which it is desirable to use for rupturing or incising the stricture, or drawing the urine, may be screwed on to it and then pushed forward, following its guide through the stricture into the bladder. The filiform bougie coils up in the bladder, doing no harm there, and is withdrawn with the larger instrument. The device is due to Maisonneuve; it has been largely applied by others.

"*Caution.*—The metallic cap upon the bougie should always be examined before it is used, to make sure that it is firmly attached to the bougie. They become loosened by time, and, if a defective instrument be used, there is danger of leaving the bougie behind in the bladder."—"Genito-Urinary Diseases." Van Buren and Keyes.

FIG. 2942.—Holt's Divulsors.



Holt's instrument consists of two blades, joined at the vesical extremity. Each blade has a handle, these are kept in place by a brace provided with a set-screw. A conducting rod runs from the point—inside of the blades—and projects one-quarter inch out of the handles. Four different sizes of tubes fit upon the rod between the handles, and are thus prevented from leaving their position when pushed onward. The degree of dilatation is determined by the size of the tube employed.

Bumstead says: "It was evident to others, as well as to myself, that the expansive power of the instrument was insufficient; that even when the largest tube of the set was employed, there were some strictures which would merely stretch as it passed, without being ruptured, and which afterwards show the marked tendency to recontraction which always follows rapid dilatation. The remedy for this was: to allow wider separation of the blades and to be supplied with larger tubes. Another change has been the addition of the filiform bougie as in Voillemiér's instrument." See Fig. 2943 (Holt's Divulsor, modified by Bumstead).

URETHRAL STRICTURE.

RAPID DILATATION AND DIVULSION.

FIG. 2943.—Holt's Divulsor,
modified by Bumstead.

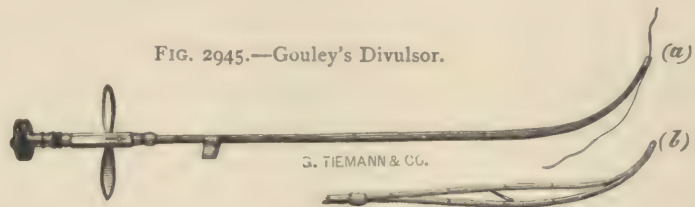


FIG. 2944.—Thompson's Divulsor.



For the treatment of stricture by gradual distension at a single sitting, even beyond the natural calibre of the canal. By means of a single lever the two parallel rods are made to "separate so as to form a long oval or spindle-shaped figure," the greater diameter of which will correspond to the seat of the stricture to be "dilated," and equal in circumference to No. 18 of the English catheter scale, or even more. In the third edition of his treatise on stricture, Sir Henry Thompson speaks of the instrument as suitable for the performance of divulsion.

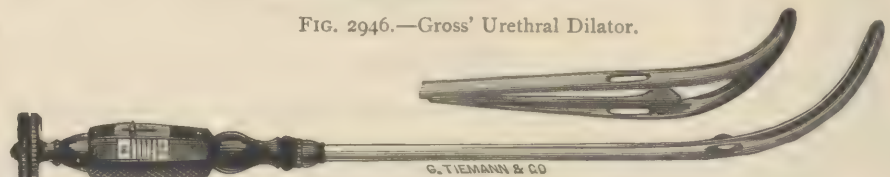
FIG. 2945.—Gouley's Divulsor.



Dr. Gouley, believing the above dilator too large for the treatment of very narrow strictures, has had it reduced in size, and modified it so that it can be used with a whalebone guide. The dimensions of the instrument, represented in Fig. 2945, are two millimetres at the extremity, and three and one-half millimetres at the part susceptible of greatest expansion. Another important modification he has made is in the blades, which instead of being flat or guttered on their inner surface for the first two inches from the point, are cylindrical, so that the urethral mucous membrane cannot be pinched and torn in withdrawing the divulsor. The curve of the instrument should not exceed one-fifth of the circumference of a circle three inches and a quarter in diameter.

Those who have a preference for any of the other divulsors, may have them modified so that they can be used with a conductor.

FIG. 2946.—Gross' Urethral Dilator.



"I have arrived at the conclusion that enlargement of the meatus is uncalled for when the relation between its size and that of the spongy urethra is normal. With this instrument, after divulsion or internal incision, the severed parts alone can be stretched during the healing process, without detriment to the remainder of the urethra. It consists of a No. 16 steel sound, the terminal two-thirds of which are split into two halves to form the blades. These are united at the vesical extremity, where they are carefully bevelled, and can be separated laterally, so as to form a spindle-shaped body, by a flattened cone attached to a rod, which is acted upon by a wheel at the proximal end of the handle. The extent to which the blades can be parted is indicated by a register, marked in millimetres, attached to the handle.

"The instrument may be used as an explorer to define the anterior face of the stricture; it may be employed for ordinary dilatation by gradually and progressively expanding the blades, or it may be utilized as a divulsor by rapidly turning the wheel."—Samuel S. Gross, M.D. *Medical Record*, June 15, 1878.

URETHRAL STRICTURE.

RAPID DILATATION AND DIVULSION.

FIG. 2951.—Thebeaud's Stricture Dilator. (Divulsor.)

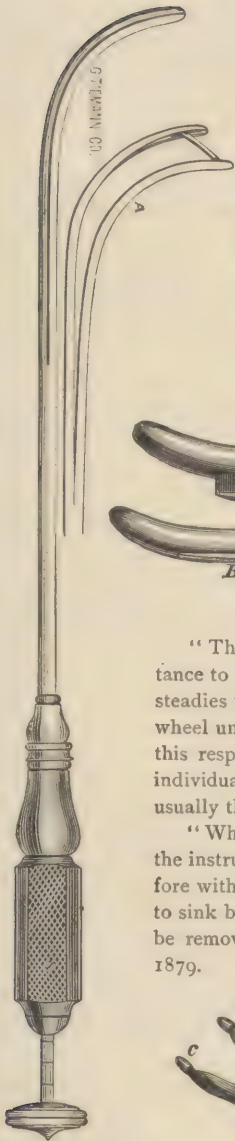


FIG. 2947.—Stearns' Dilator.

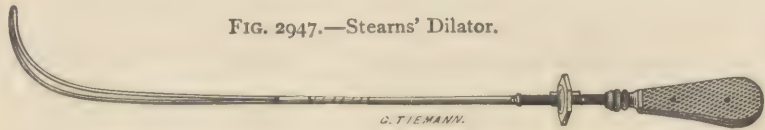


FIG. 2948.—Powell's Dilator.

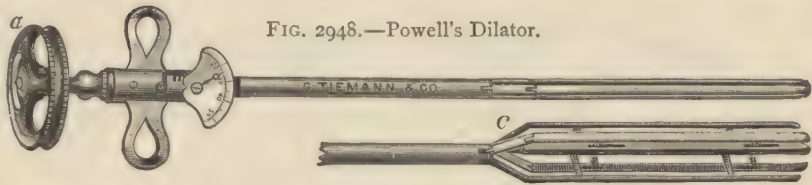
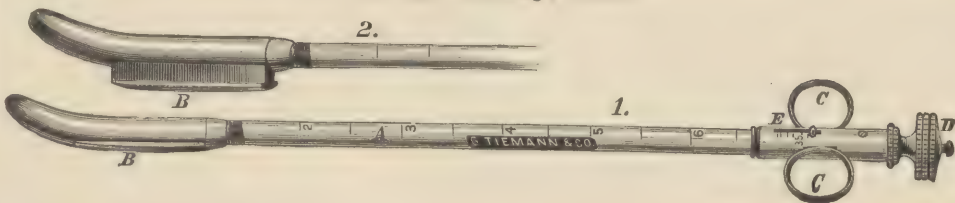


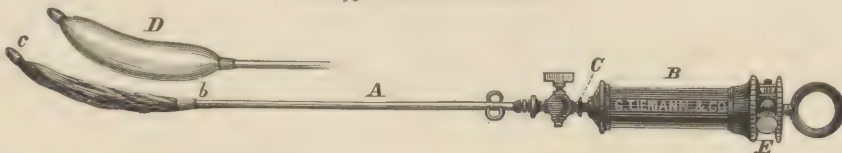
FIG. 2949.—Schweig's Dilator.



"The exact location of the stricture having been determined, the dilator is introduced a distance to make the centre of the dilating wedge to correspond with the stricture. One hand then steadies the instrument by means of the ring handles, while the other slowly turns the screw-wheel until the desired degree of dilatation is obtained. The index gives accurate information in this respect, and will serve to keep dilatation within safe limits, as defined by the calibre of the individual urethra. When the patient complains of pain desist, or wait a few minutes, when usually the pain subsides, and one or two more numbers may be advanced.

"Where resiliency is so prominent a feature that slow and gradual dilatation proves unavailing, the instrument will be found a *perfect divulsor*, by simply turning the screw-wheel rapidly. Before withdrawing the instrument, the screw must be turned all the way back, to allow the wedge to sink back within the shaft. The instrument is so constructed that, after use, the wedge can be removed entirely, and both it and the shaft thoroughly cleaned."—*Medical Record*, May 3, 1879.

FIG. 2950.—Steurer's Dilator.



"The instrument is composed of a hollow canula (A) with a bulb at the end (C); the portion between b and c is composed of pure copper, which allows to make any fixed curve, or of a spiral, which makes it very flexible. Over b and c is a membranous tube fastened at both ends. The canula is perforated within the membrane to allow free passage of water. B is a hard rubber syringe, with a graduated piston, and worked with a rack and pinion, the latter being removable. There is also a rubber band attached to the head of the syringe and passing through the ring of the piston, so that by its own elasticity it draws the latter down, thus making the instrument also work automatically, and in proportion as the membrane becomes distended by the water the stricture is dilated. D shows the tube dilated.

"The manner of using the instrument is as follows: The membrane is soaked in carbolized water until it becomes very flexible; all the air is driven out of the tube by compressing the membrane, which is then greased. The syringe, being filled with carbolized water, is screwed on the canula, which is then introduced through the stricture. The water being forced out of the syringe, gradually distends the membrane and thereby the stricture."—*Medical Record*, New York, September 22, 1877.

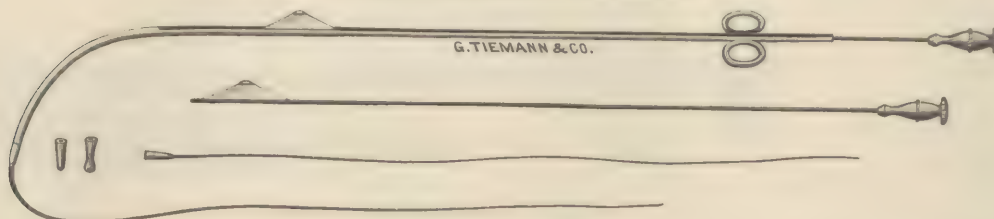
URETHRAL STRICTURE.

INTERNAL URETHROTOMY.

"Introducing into the urethra a knife (urethrotome), with which the strictured part is incised, together with a little uncontracted tissue in front and behind. The design is to obtain union by granulation, and with the aid of dilating instruments to insure the formation of a wide *cicatricial splice*."—"Diseases of the Urinary Organs." Gouley. 1873.

Instruments Cutting from Before Backwards.

FIG. 2952.—Maisonneuve's Urethrotome.

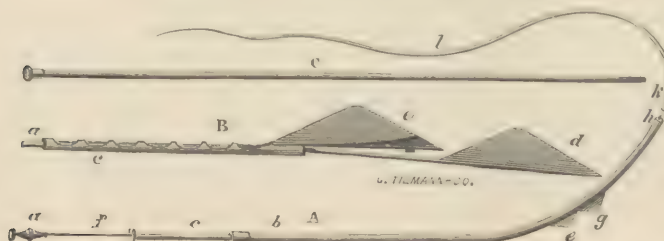


It consists of a deeply grooved sound, with a small ring near its distal extremity as handle, a long stem with triangular knife attached and a gum elastic filiform conducting bougie.

The steps of the operation, according to Maisonneuve, are as follows:

1. The gum elastic conducting bougie is introduced past the stricture.
2. The vesical end of the *sound* is screwed to it, and the instrument is slowly and gently pushed onward until it has gone beyond the obstruction and can be moved back and forth without impediment. (The conducting bougie may coil up in the bladder.)
3. The blade is made to glide into the groove of the sound until it has reached the part to be divided; the penis is then drawn forward, the sound steadied and the cutting blade pushed onward.
4. The instrument is slowly and cautiously withdrawn and the operation is thus terminated.

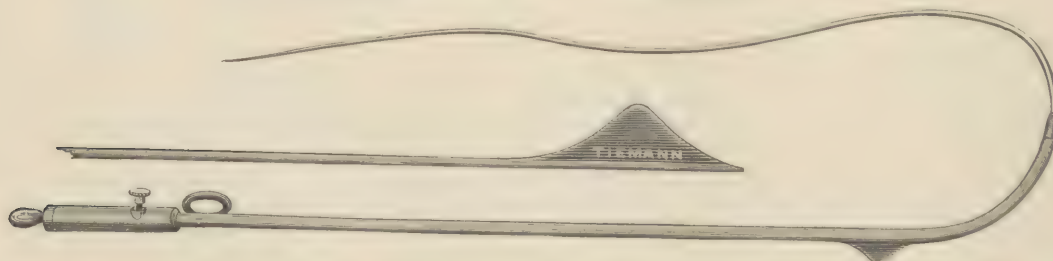
FIG. 2953.—Voillemiér's Urethrotome.



"After many experiments with this instrument it was found that the healthy mucous membrane did not usually escape injury. On this account Voillemiér made a modification in which the blade is guarded by a plate of the same size and shape, and the summit is sharp, not blunted as in the original.

"The operative procedure with Voillemiér's urethrotome, and the many other modifications, differ but slightly from the foregoing."—"Diseases of the Urinary Organs." Gouley. 1873.

FIG. 2954.—Bumstead's Maisonneuve's Urethrotome.



Among other urethrotomes used by American surgeons are those of Banks, Bates, Gouley, Gross, Hunter, Kinloch, Mastin, Milnes, Nall, Otis, Peters, Pritchett, Rogers, Smith, Stearn, Westmoreland, Wyeth, &c., &c.

URETHRAL STRICTURE.

INTERNAL URETHROTOMY.

For Operating from Before Backwards.

FIG. 2955.—Gouley's Tunnelled Urethrotome.



"The first and really difficult step of Maisonneuve's operation is to pass the gum conductor. I have often witnessed bending of the bougie in front of the obstruction, so that its point would appear at the external orifice. My success with capillary whalebone bougies induced me to employ them as conductors in urethrotomy, and I had but to adopt Maisonneuve's blade to the vesical end of my smallest tunnelled sound and I had a urethrotome of the simplest construction for cutting from before backward. The blade being sharp, both in front and behind the blunted summit, could also be used to cut from behind forward.

"Fig. 2955 represents the instrument, which is nearly straight, and I have experienced no trouble in using it, either in the sub-pubic curve, or in the pendulous portion of the urethra.

"The operative procedure is as follows:

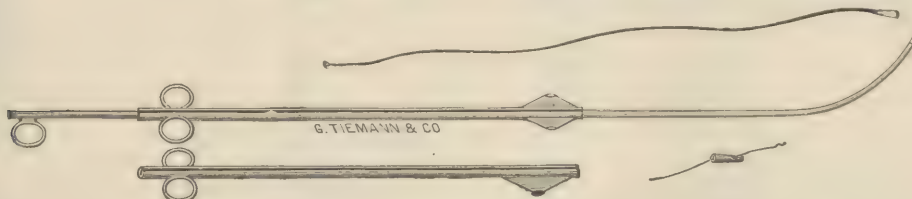
- "1. The capillary whalebone conductor is passed into the bladder.
- "2. Its distal end is slipped through the smallest tunnelled sound, and a little dilatation made, to facilitate the entrance of the point of the urethrotome, and the sound is withdrawn.
- "3. The tunnelled urethrotome is introduced in a similar manner as is the tunnelled sound. The penis is steadied with the left forefinger and thumb, and the stricture divided by sliding the instrument gently upon the conductor until all resistance to its passage ceases.
- "4. The instrument is withdrawn, but the conductor left in position, that a large tunnelled catheter may be introduced, in order to ascertain if the incision has been sufficiently free, and at the same time to draw off the urine."—"Diseases of the Urinary Organs." Gouley.

FIG. 2956.—Gouley's Improved Tunnelled Urethrotome.



"The same objections made to Maisonneuve's urethrotome have been urged against mine. I have, therefore, followed Voillemier's example and placed a guard on one side of the blade. The improved tunnelled urethrotome is straight and designed for operations in the pendulous portion of the urethra."—"Diseases of the Urinary Organs." Gouley.

FIG. 2957.—Pritchett's Rotating Urethrotome.



"It may be called a modification of Maisonneuve's, and consists of the following parts: First, we have a plain cylindrical rod or staff, fifteen inches long, two millimetres in diameter, and with the short curve of Bumstead. The external extremity has attached on its under surface a ring to serve as a handle, while the internal extremity terminates in a screw for the attachment of filiforms. A tunneled screw-head (Gouley's attachment) is also provided to screw on for using the finest whalebone guides. Next, and in this consists the peculiarity of the instrument, we have three tubes, each seven inches long, and fitting the rod closely, and with a slit down its entire length so as to pass the ring-handle of the staff. At the external extremity of each tube are attached laterally two rings for handles; while each internal extremity is beveled so as to pass strictures more readily. One tube carries at its internal extremity, attached superiorly, a triangular, probe-pointed blade, nine millimetres in size, also attached superiorly; while the third tube carries two similar blades, each four millimetres in size, attached laterally.

"The staff is made so long (fifteen inches) in order that the entire tube may pass the ring-handle before the blade enters the meatus."—*New York Medical Journal*. July, 1878.

URETHRAL STRICTURE.

INTERNAL URETHROTOMY.

For Operating from Before Backwards.

FIG. 2958.—Teevan's Stricture Cutter, with Guide and Tunnel.

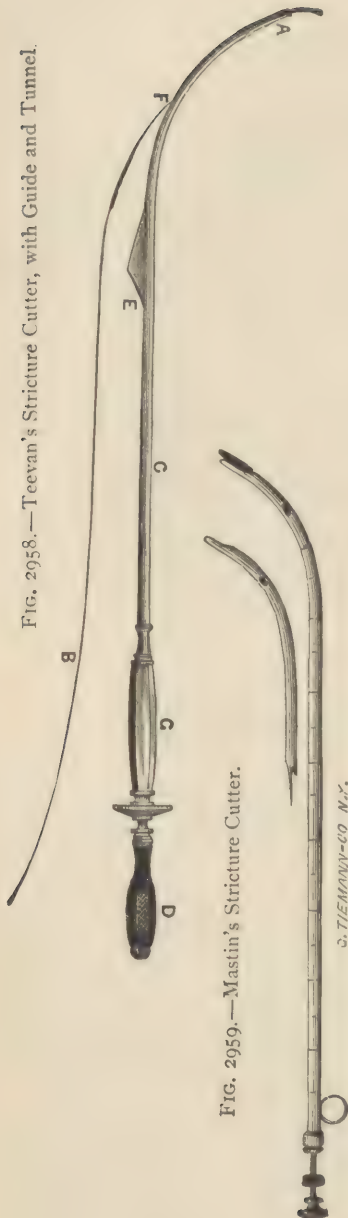


FIG. 2959.—Mastin's Stricture Cutter.

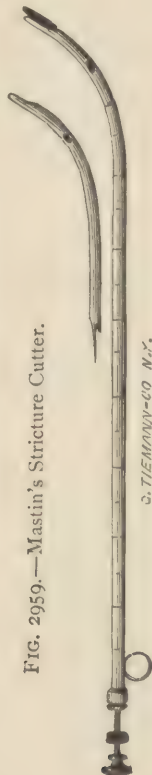


FIG. 2960.—Trelat's Urethrotome, both ways.

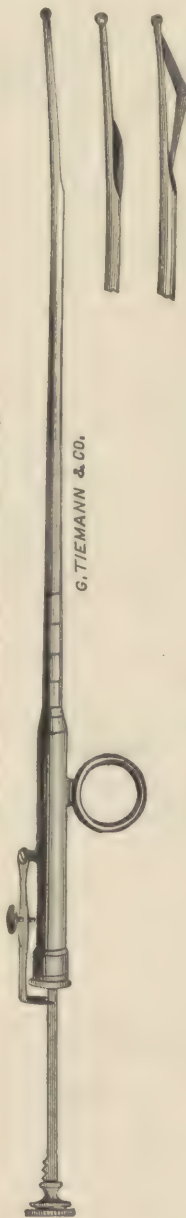


FIG. 2961.—Gross' Urethrotome.

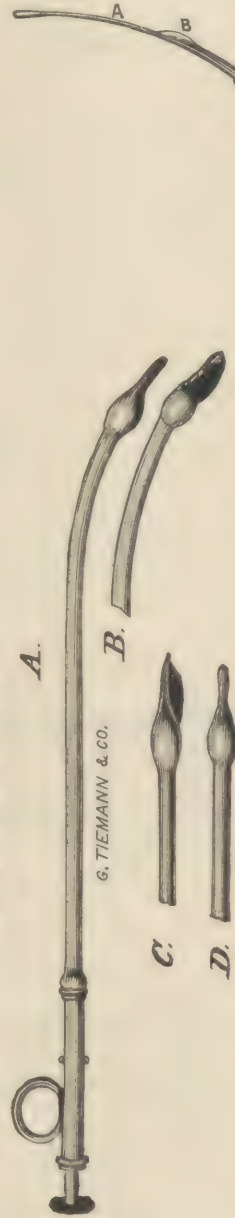


FIG. 2962.—Westmoreland's Stricture Instrument.



FIG. 2963.—Mastin's Maisonneuve's Urethrotome.



URETHRAL STRICTURE.

INTERNAL URETHROTOMY.

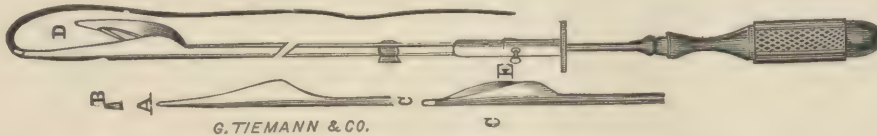
For Retrograde Operation.

FIG. 2964.—Civiale's Urethrotome.



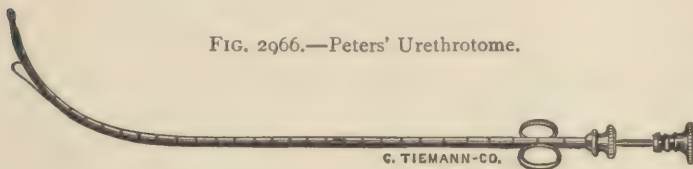
The terminal olivary extremity is used as an explorer, and serves also to guard the blade, which can be opened to the degree required.

FIG. 2965.—Charrière's Stricture Cutter.



This is a modification of Civile's urethrotome, with Maissonneuve's gum conductor. When the instrument has been carried down to the stricture, the concealed blade is pushed forward so as to incise the constriction; it is then carried beyond, the blade projected as much more as the operator deems necessary, and the stricture more fully divided in withdrawing the instrument a little.

FIG. 2966.—Peters' Urethrotome.



A plain metallic sound, marked in quarter inches, by which the depth of its introduction is noted, and grooved for the reception of a urethrotome, consisting of a round steel rod, with a metallic button to serve as handle, and terminating in a thin spring cutting blade. The edge

of the blade is entirely concealed in the groove of the sound, except at a point about one-half or three-quarters of an inch from the point, where it is made to ride over an elevation in the groove, thus displaying the blade for the length of about half an inch, and again dropping into concealment. The instrument is introduced beyond the stricture, the cutting done by pulling on the knife and withdrawing the instrument a little.

FIG. 2967.—Bumstead's Urethrotome (modification of Peters').

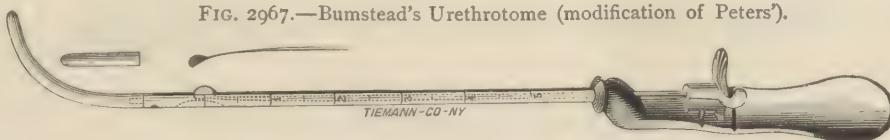
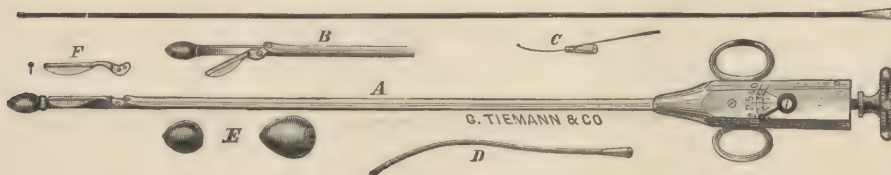


FIG. 2968.—Kinloch's Urethrotome.



A. Instrument entire, with small bulb attachment. *B.* Section, showing the blade projected and ready for use. *C.* Tunnelled end attachment, with whalebone guide. *D.* Probed end or short elastic guide. *E.* Bulbous attachments, of different sizes. *F.* Blade, detached to show formation, shoulder, &c. *G.* Long elastic bougie guide attachment.

FIG. 2969.—Bates' Urethrotome.

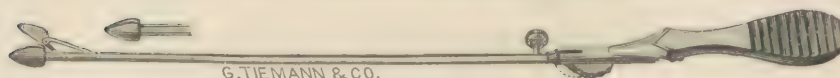


URETHRAL STRICTURE.

INTERNAL URETHROTOMY.

For Retrograde Operation.

FIG. 2970.—S. W. Gross' Exploratory Urethrotome.



"Of the two modes of inserting a soft pliable splice in the contracted part, and in the sound tissues of its immediate vicinity, I give decided preference to internal urethrotomy from behind forwards. In forcible rupture, short oblique rents are liable to be made in the healthy mucus membrane, which, after the healing process is completed, may form partial traumatic strictures. In internal urethrotomy, on the other hand, the contracted part can be divided with the utmost precision, while the sound portions of the urethra are free from injury. The instrument which, from the simplicity of its construction, perfection and action, accurate definition of the stricture, and moderate cost, I prefer for retrograde division, is the one devised by myself three years ago (Fig. 2970). It is nothing more than a metallic exploratory bougie, the slender shaft being provided with a handle, and grooved for the reception of a steel rod, to one end of which is attached the blade and to the other a button, through the retraction of which the former is thrown out of the under surface of the bulb, so that the incision may be made along the floor of the urethra. The extent to which the blade can be projected is regulated by a lateral screw near the handle. The length of the contrivance is 11 inches, of which three are taken up by the handle, button and screw. In actual practice I have found two such instruments to be all that are required. In one, which is intended for strictures of moderate calibre, the bulb is equal to No. 15 of the French catheter scale, while, in the other, the bulb corresponds to No. 23, which suffices to define coarctations of much larger size.

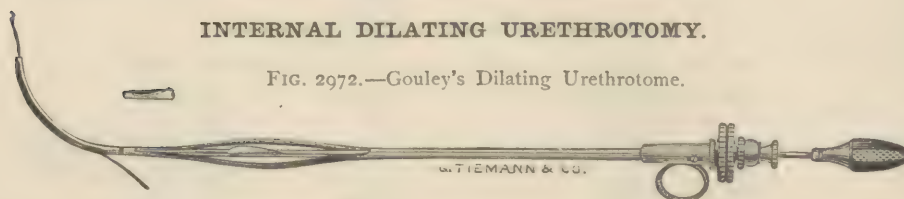
"To use the exploratory urethrotome: The stricture having been passed, and its posterior face having been accurately defined by the projecting shoulder of the bulb, the latter is carried at least half an inch towards the bladder—as the object is to cut, along with the coarctation, the sound tissues to that extent behind and in front of it—when the blade is protruded by sliding the button, and the parts divided as the instrument is withdrawn, the penis being put upon the stretch to render the urethra tense. Should the tissues be thick or resistant, the section may be materially aided by counterpressure with the fingers of the left hand along the median line. The bulb is then used as an explorer to detect any undivided bands, which, if discovered, should next be severed, since thorough section of all constricting bands is essential to success."—Samuel W. Gross, M. D. *Medical Record*, June 15, 1878.

FIG. 2971.—Banks' Urethrotome.



INTERNAL DILATING URETHROTOMY.

FIG. 2972.—Gouley's Dilating Urethrotome.



"I have had a small dilating urethrotome made with Dr. Peters' cutting blade, but with two lateral dilating springs, so arranged that only the constricted portion of the urethra is stretched. The point is tunnelled so that a capillary conductor may be used in cases of false routes. It is introduced closed into the urethra until the central portion of the dilating springs correspond to the stricture to be stretched. The screw near the handle is turned until the springs are sufficiently expanded to make the strictured portion tense, then the blade is protruded and the stricture divided. Further dilatation may be made, the blade pushed back—this time cutting from before backwards—and dilatation repeated perhaps a third time, when the stricture tissue is cut through completely. The urethra is afterwards explored with a full-sized bulbous bougie, to be sure that there is no hindrance to the passage of a large sound. The after-treatment is the same as in ordinary urethrotomy, namely periodical catheterism with large instruments during, and for some months after, cicatrization."—"Diseases of the Urinary Organs." Gouley. 1873.

URETHRAL STRICTURE.

INTERNAL DILATING URETHROTOMY.

Stricture of the Urethra: Its Radical Cure. Chapter XVII.

By FESSENDEN N. OTIS, M. D.

"The points which are claimed to have been established by observations are:

- "1. That the urethra is an *individuality*, and hence, to obtain the true normal calibre of any urethra, it must be measured, or estimated, independently of any other.
- "2. That the meatus urinarius is worthless as a guide to the normal urethral calibre, and that its normal contraction is the cause of the pouch-like dilatation of the urethra behind it, known as the *fossa navicularis*.
- "3. That stricture is a relative term; hence its extent must always be estimated by comparison with the previously ascertained normal calibre of the urethra under consideration.
- "4. That the slightest *abnormal* contraction of the urethra, at any point, constitutes a stricture.
- "5. That a stricture, in this sense, is always a point of friction, the legitimate tendency of which is to produce inflammation; and hence the slightest appreciable stricture becomes worthy of consideration. That serious trouble often results from strictures which but slightly contract the calibre of the urethra and which do not markedly interfere with the passage of urine; and that, among such troubles, *spasmodic stricture*, simulating true organic stricture in every respect, is often caused by such slight contractions.
- "6. That stricture is a cause, though not the *only* cause of gleet; and is, when present, always a cause of its persistence.
- "7. That stricture always embraces the entire circumference of the urethra at *some* point.
- "8. That complete division of stricture at *any* point results in *immediate disappearance* of the stricture.
- "9. That separation of the sundered ends of the stricture, suitably maintained, until the healing of the wound, prevents the return of the stricture and finally results in the complete absorption of the stricture tissue.
- "10. That stricture is, strictly speaking, an inflammatory product, and that any acute or chronic inflammation may produce it.
- "11. That stricture is often present as a result of inflammation caused by *lithiasis, masturbation, or urethral laceration* (by gravel, &c.), though usually the sequel of gonorrhœa.
- "12. That stricture occurs most frequently in the anterior portion of the canal; and with increasing frequency when approaching the meatus where a gonorrhœal inflammation begins the earliest, rages the hottest and lasts the longest.

"From authorities and their followers, who have hitherto denied the possibility of radical cure of urethral stricture, I anticipate continued denial, until they shall have conscientiously and exactly carried out the plans and procedures through which my success has been attained, and have had the opportunity of testing the results by years of observation, as I have done. In the meantime other independent, honest and capable observers will aid me in educating the general profession up to the point of departing so far from established doctrines as to give the rational treatment of stricture a fair trial. This effected, I believe the day will not be far distant when close stricture will be deemed a surgical opprobrium, and the continuous treatment by dilatation, except under rare and peculiar circumstances, will be relegated to physicians or to the patient, and this only as a temporary expedient to be practiced until competent surgical aid is attainable.

"I am prepared to assert that such results as I have recorded are not exceptional and may be attained by any surgeon who will provide himself with the necessary instruments for the performance of dilating urethrotomy, and use them in accordance with the plans and principles previously enforced and *with the exercise* of such judgment and skill as are considered essential to success in any other operation of like importance."—New York, July 1, 1878.

Diagnosis of Stricture.

FIG. 2973.—Otis' Bulbous Sound. (Improved.)



"In explorations of the urethra with this instrument, I am accustomed to accept the meatus, if apparently of normal size, as a gauge of the urethral calibre; that is to say, any instrument which will pass that orifice will easily traverse the entire canal if no abnormal condition is present. It should be borne in mind, however, that both congenital and pathological contractions of the meatus are not infrequent.

See also Fig. 2886.

URETHRAL STRICTURE.

INTERNAL DILATING URETHROTOMY.

Diagnosis of Stricture. (Continued.)

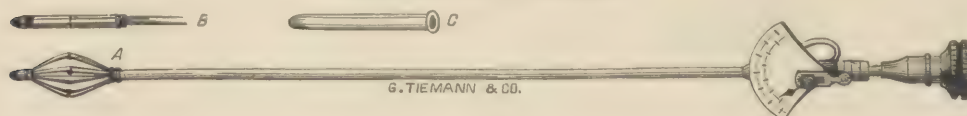
"A bulb, with its shaft bent to correspond with the curve of an ordinary sound, is accurately fitted to the urethral orifice, then slowly inserted and pushed gently back until some resistance is recognized. Muscular contraction may arrest the instrument at any point along the spongy urethra, but, with a little delay, this will subside. As the bulb advances it may impinge upon the triangular ligament; tilting the shaft upward will clear this point. Muscular contraction will also usually occur at the commencement of the membranous portion at the posterior part of the prostatic, gently overcoming which, the bulb slips into the bladder. This is the usual course of the proceeding when no contraction has been recognized. After allowing the bulb to remain in the bladder for three or four minutes, it is slowly withdrawn; if contractions are present at any point, slight clinging or want of suppleness will indicate their locality, and, in moving the bulb back and forth, where resistance is appreciated, a diagnostic ridgy feel may be recognized. Should this proceeding fail in locating a constriction, I am then accustomed to slit up the meatus freely,* and repeat the operation with the largest bulb that will enter the spongy portion. Failing with this, a full sized meatoscope, without the entering shaft, is introduced under the light, and slowly pressed back along the passage, carefully noting any paling or lack of flexibility of the membrane at any point. Should this last effort yield no evidence of undue condensation of tissue, I am forced to conclude that no contraction is present."—"Stricture of the Male Urethra." F. N. Otis, M. D. 1878.

Otis' Table; showing the Relative Circumference of the Penis and Urethra.

PENIS.			URETHRA.		
3 inches	or	75 millimetres,	30 millimetres.		
3 $\frac{1}{4}$ "	or	81 "	32 "		
3 $\frac{1}{2}$ "	or	87 "	34 "		
3 $\frac{3}{4}$ "	or	92 "	36 "		
4 "	or	100 "	38 "		
4 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.,	or	106 to 112 "	40 "		

The estimate of the size of the urethra from its proportionate relation to the size of the penis is but approximate, and intended only to serve as a guide where the urethrometer is not available. Examined by the rule laid down, experience has shown that the estimate will never exceed the normal calibre, though it often falls short of it several millimetres circumference. The flaccid penis is subject to variation from heat, cold, &c., but, practically, it will be found that the relative conditions will always be the same *when the patient presents to the surgeon*. Measurements should always be made at about midway of the body of the penis.

FIG. 2974.—Otis' Urethrometer.



"In order to gain a definite knowledge of the calibre of the urethral canal, in cases with or without contraction of the meatus, I have devised an instrument which I term the urethrometer, or dilating bulbous sound. It consists of a small, straight canula, size No. 8, Fr., terminating in a series of short metallic arms, hinged upon the canula and upon each other. At the distal extremity, where they unite, a fine rod, running through the canula, is inserted. This rod (which is worked by a stationary screw at the handle of the instrument), when retracted, expands the arms into a bulb-like shape, ten millimetres in circumference when closed, and capable of expansion up to forty millimetres. A thin rubber stall, C, drawn over the end of the closed instrument, protects the urethra from injury, and prevents the access of the urethral secretions to the interior of the instrument. When introduced into the urethra and expanded to a point which is recognized by the patient as filling it completely—and yet easily moving back and forth—the index at the handle then shows the normal circumference of the urethra under examination. In withdrawing the instrument, contractions at any point may be exactly measured, and any want of correspondence between the calibre of the canal and the external orifice be readily appreciated. Among the advantages claimed for this instrument are: 1. Its capacity to measure the size of the urethra, and to ascertain the locality and size of any strictures present, *without reference to the size of the meatus*; 2. It enables the surgeon to complete the examination of several strictures by a single introduction of the instrument, and by reduction of its size to avoid the irritation which usually attends the withdrawal of the ordinary bougie à boule or bulbous sound."—"Stricture of the Male Urethra." F. N. Otis, M.D., &c., &c., 1878.

* See MEATOTOME, page 347.

URETHRAL STRICTURE.

INTERNAL DILATING URETHROTOMY.

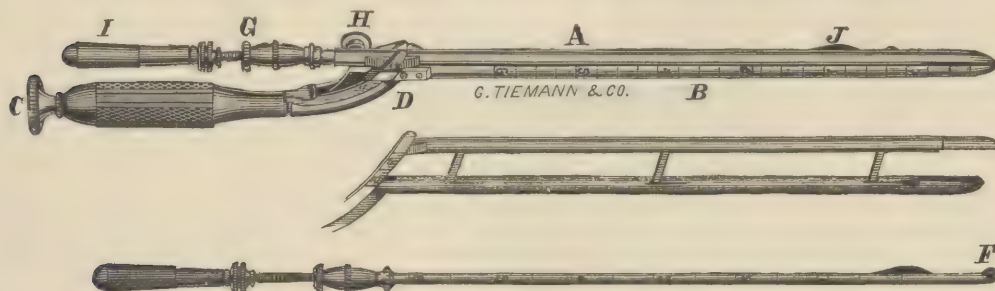
For the preparatory Dilatation of Strictures too small to admit the necessary instruments for immediate operation.*

The normal calibre once obtained by means of the urethrometer, or by measurement of the flaccid penis, the method by which the sundering of the stricture at some one point is accomplished may vary, and rest in the judgment of the operator. If dilatation or divulsion be selected as the medium through which to effect this result, the procedure must be carried far enough to *completely* rupture every fibre of the contraction; if division, *every fibre* must be completely severed, or subsequent recontraction is certain.

Otis' dilating urethrotomes are known as Nos. 1, 2, 3, 4, in the order of their invention; Nos. 1 and 2 dilating and cutting at a single predetermined point, while Nos. 3 and 4 dilate the entire canal. Each has advantages which cannot be combined in the other, but neither one will answer in all cases of single stricture. When several strictures are present, especially if close together, the latter numbers are to be preferred. No. 4 has the advantage of being adapted to any stricture in the straight urethra without distending the curved portion of the canal.

Dr. Otis asserts that strictures divided by one of these, or any other instrument, in accordance with the irrevocable law of *complete division of every fibre*, followed by the daily use of sounds of the full capacity of the canal, until all bleeding ceases, will accomplish a speedy cure.

FIG. 2975.—Otis' Dilating Urethrotome, No. 1, for Dividing Strictures of Large 'Calibre.



(Presented to the profession Nov. 24, 1871.)

"The dilating urethrotome (No. 1) consists of a pair of steel shafts connected together by short pivotal bars shown at 2. Its expansion or contraction is effected by means of a screw which traverses the handle connected with the lower shaft at C. The extent of the dilatation is indicated on one side of the instrument in numbers according to the American, on the other with those of the French scale. Upon the inferior shaft (B) is engraved a scale of inches and quarter inches, by which the depth of its introduction into the urethral canal may be noted. Up to this point the instrument is simply a *divulsor*, and may thus be used by introducing it beyond the supposed point of stricture; the screw (C) is now turned, dilating the instrument, until, if considered desirable, the stricture is completely ruptured.

"The upper bar of the instrument, which is hollowed out, is traversed by a *urethrotome* (3), the distal extremity of which terminates in a little metallic knob (F, 3); by the *metallic* handle of the urethrotome it is moved at will along through the entire length of the shaft (A) of the dilator; a small button screw (H) secures the canula at any point. Running through the canula and attached to a handle (I) is the staff terminating in a thin narrow spring knife, which, when at the extremity of the canula, is concealed in a deep groove which extends on its superior aspect through its entire length. On withdrawing the handle of the urethrotome (I) the spring knife rises out of the groove by means of a little elevation on its floor, rides over it, displaying the full width of the blade for half an inch, when it again drops down and is concealed in the groove of the canula.

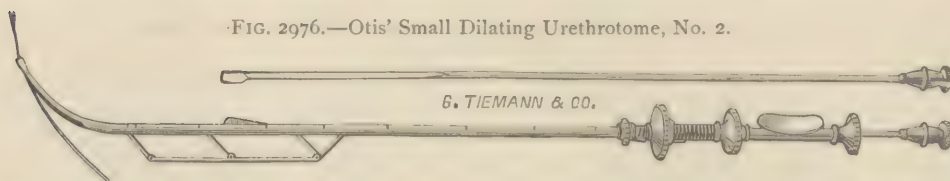
"*Use.* The instrument, with its contained urethrotome, having been passed down beyond the stricture, and dilated until the stricture is made *tense*, the button screw (H) is turned, releasing the canula, which may then be drawn carefully outward until the knob at its extremity is arrested by the stricture. The canula is then advanced about half an inch and secured by the screw (H). A rapid movement of the handle (I) of the urethrotome, *outward*, brings its blade up through the stricture, from behind it forward, incising it almost instantaneously, and passing down again into its concealment. The *dilator* is then sufficiently expanded to ascertain whether or not the stricture is completely divided; if not, the knife may be passed *from before backward*, completing the operation."—"Remarks on Strictures of the Urethra of Extreme Calibre, &c." F. N. Otis, M.D., &c., in *New York Medical Journal*, February, 1872.

* See "Otis' Dilating Catheter," Fig. 2898, and "Otis' Divulsing Urethrotome," Fig. 2981, also Fig. 2978.

URETHRAL STRICTURE.

INTERNAL DILATING URETHROTOMY.

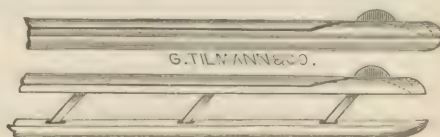
FIG. 2976.—Otis' Small Dilating Urethrotome, No. 2.



"This specimen, devised by me and constructed by Tiemann & Co., is equal in size to thirteen millimetres, or $5\frac{1}{4}$ English scale. Its mechanism is exceedingly simple. The principle of its action being that of the parallel ruler, expanding by means of a screw at the handle, is the same upon which my original instrument (Fig. 2975) is constructed.

"The cutting apparatus is also virtually the same. An independent rod, terminating in a blunt elevation, plays the part of a *bougie à boule* for the detection and location of the stricture points. In order that it may readily be passed down into the curved portion of the urethra, its shaft, which terminates in a copper probe point, may be easily adapted to the curves of the deeper portions of the canal, and also enables the operator to arrange it for cutting at will upon either the superior or inferior aspect of the urethra, and, when straightened, can be used as well for operation upon strictures in the straight portion of the canal; a movable hard rubber slide marks the required depth of insertion. Its efficiency was demonstrated at my office, January 29, 1873. The instrument has an expanding power up to 40, F.—"Strictures of the Male Urethra." F. N. Otis, M.D., &c., &c., 1878.

FIG. 2977.—Otis' Dilating Urethrotome.



"Incurvation of the penis during erection is an occasional sequel of urethrotomy, being caused by an inflammatory thickening along the superior surface of the urethra at the point of operation, where more or less discomfort may be experienced, as during erection this part becomes tense and salient. Taking advantage of the knowledge gained by M. Reybard in his experiments on dogs (*i. e.*, that transverse sections of the urethral tissues resulted in stricture, while longitudinal incisions were not open to that objection), I devised an instrument or, rather, I modified my first dilating urethrotome (Fig. 2975), so that, while distending and fixing the urethral tissues firmly, I might divide them in a *diagonal* line across the superior aspect of the canal. The above cut gives an idea of the modified instrument. With this I succeeded in dividing the cord completely, giving immediate and perfect relief. It may be interesting to note here that the *diagonal incision* was not followed by stricture."—"Stricture of the Male Urethra: Its Radical Cure." F. N. Otis, M. D. 1878.

FIG. 2978.—Otis' Bulbous Urethrotome.



"This urethrotome was first used in 1874, and presented to the profession in my pamphlet on 'Instruments and Apparatus,' May, 1875. This in shape is like the bulbous sound, so constructed that, after passage through a stricture, a broad blade two to three millimetres in breadth, concealed in the bulb, is drawn forward through the contracted point, by means of a handle which traverses the hollow shaft of the instrument. The blade is then pushed back through the stricture into its place of concealment, and the instrument is withdrawn. If the bulb has been of sufficient size to make firm resistance on attempted withdrawal *before*, and meets with none *after* incision, it is probable that the test by a bulbous sound of the size of the normal canal will show that the division has been complete. The bulbs of this urethrotome are readily changed, and range in size from 20 F. to 40 F.

"For the division of narrow and dense strictures in the deep urethra, this instrument is often efficient, but it lacks the certainty of action which characterizes the dilating urethrotome. Where, however, it is employed, the incisions are confined more completely to the cicatricial tissue, and consequently are less often followed by troublesome hæmorrhage."—"Stricture of the Male Urethra: Its Radical Cure." Fessenden N. Otis, M.D., &c., &c. 1878.

URETHRAL STRICTURE.

INTERNAL DILATING URETHROTOMY.

"Between the years 1874 and 1876 I made various changes in minor points about my dilating urethrotome, with a view of increasing its ease of application and the safety of its use. The chief alteration from the original was the attachment of a guard to the summit of the blade, in order, after the plan of M. Maisonneuve, to divide only stricture tissue.

After a time, however, it was found that slight and resilient strictures often escaped complete division, and *always* unless the overdistention was very great. I therefore removed the guard and concealed the blade in a slit at the end of the shaft. I likewise had the instrument made straight and short, for more convenient use in the straight portion of the canal where, fortunately, according to my observations, much the greater proportion of strictures are to be found.

"Heretofore all operations by internal urethrotomy have been performed as a last resort, after failure to obtain relief by other methods. It thus happens that a very large proportion of such cases have been the subject of advanced disease of the bladder and kidneys. The simple introduction of a sound or catheter where such organic disease is present has not unfrequently caused urethral fever, suppression of urine and death. It has therefore come to pass that the operation of internal urethrotomy, necessitated in these desperate cases, has been held responsible for fatal issues which were likely to result from any mode of interference. I am able to state with confidence, that complete division of all strictures anterior to the bulbous urethra (*i.e.*, from five to six inches), by dilating urethrotomy properly performed, is one of the simplest and safest of all surgical operations; that in the very large proportion of cases it is uncomplicated by a simple accompaniment which can be termed an accident, and that the recovery is, as a rule, practically complete in from three days to a fortnight after the operation—the variation depending upon the number, depth and calibre of the strictures.—

F. N. Otis, M.D. 1878.

FIG. 2979.—Otis' Dilating Urethrotome, No. 3

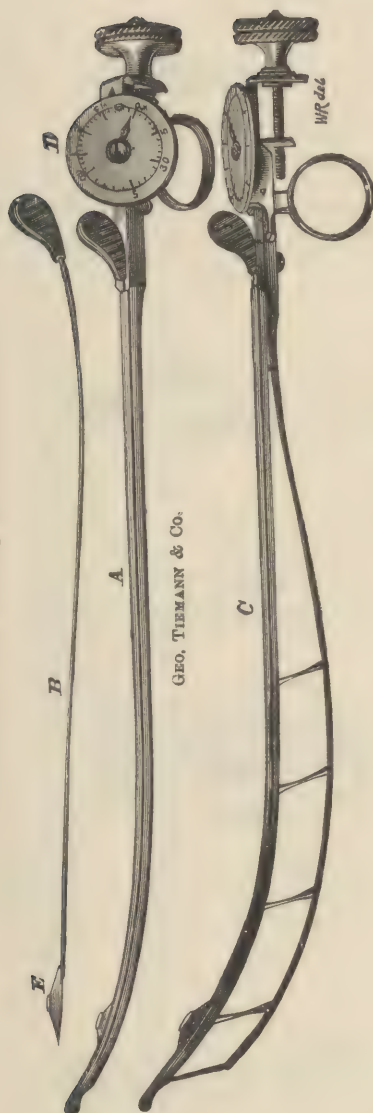


FIG. 2980.—Otis' Dilating Urethrotome, No. 4

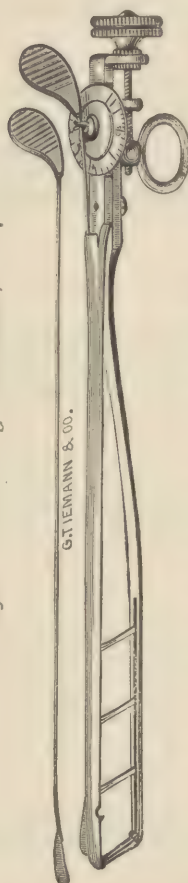
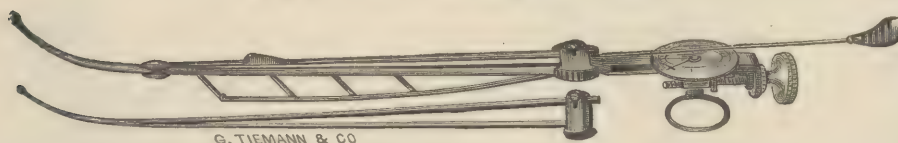


FIG. 2981.—Otis' Divulsing Urethrotome.

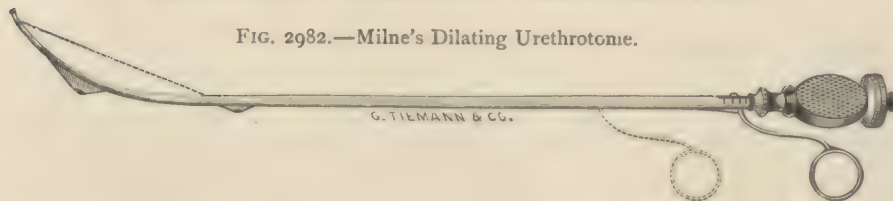


"When strictures of small calibre are situated in the penile urethra, where the greatest proportions of stricture are found, there need be but little apprehension of danger from the use of immediate measures. Divulsion may be made with the instrument of Thompson, Holt, Voilemier, and myself. Division by the urethrotome of Maisonneuve has, in my hands, often proved serviceable. In all diseases, however, where there is no necessity for immediate operation, I have preferred to use gradual dilatation by means of soft French bougies to bring them at once up to the size requisite for the passage of the dilating urethrotome."

URETHRAL STRICTURE.

INTERNAL DILATING URETHROTOMY.

FIG. 2982.—Milne's Dilating Urethrotome.



"The dilator is brought into action by the screw at the handle, producing traction upon a flexible rod attached to the terminal extremity, being lifted from a curve to bridge over the concavity. Upon the convex side slides a guarded knife for dividing the stricture tissue."—*N. Y. Medical Record*. Feb. 19, 1876.

FIG. 2983.—Stearns' Dilating Urethrotome.

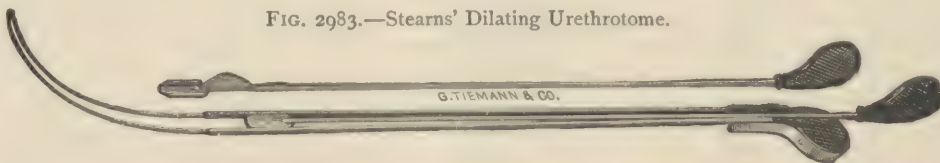


FIG. 2984.—Geo. K. Smith's Urethrotome.

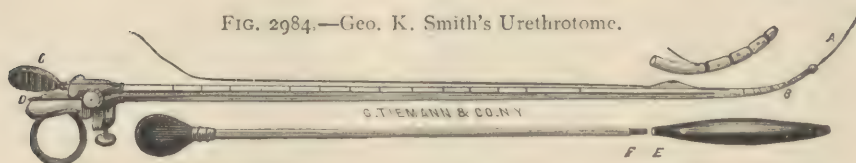
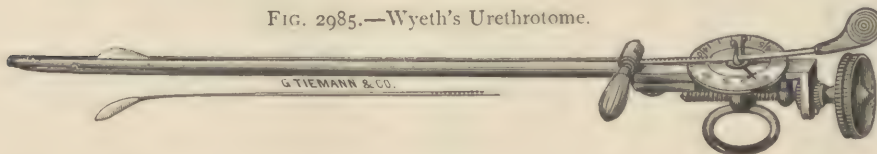


FIG. 2985.—Wyeth's Urethrotome.



"Dr. Wyeth also exhibited a modification of Dr. Otis' Urethrotome. The modification consisted in the attachment of a cogwheel arrangement, by means of which the movements of the knife could be regulated and arrested at any desired point."—*New York Pathological Society*. Stated meeting, November 26, 1884. *Medical Record*, January 3, 1885.

FIG. 2986.—R. B. Nall's Urethrotome.



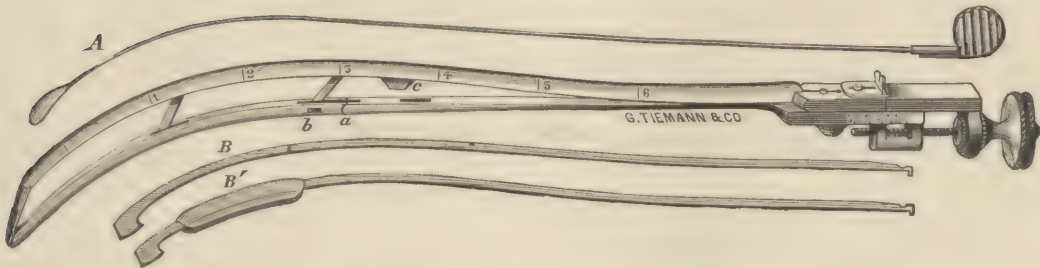
The instrument itself defines the diseased tissue. The incision is confined to the stricture. It subverts the purpose of a urethrometer. It possesses the power of adaptability from 26 French scale to 50. The functions of the bulbous sound, urethrometer and urethrotome are all blended into one single instrument.

Manner of using this instrument: The bulbous portion is well oiled and passed into the penis beyond the stricture in a closed condition, the upper half bulb in which the knife is concealed always against the superior wall; when the bulb is a little beyond the stricture the instrument is then to be separated by means of the thumb-button as desired to the already calculated width. Now withdraw the instrument in this open condition, when the shoulders of the half-bulbs will come in contact with the posterior surface of the stricture; then the knife may be withdrawn, severing the band. When this one is cut, the knife is returned to its place of concealment in the upper half bulb, and then the instrument becomes a urethrometer. Continue to withdraw it steadily in this open state, and when other bands are defined, withdraw the knife and treat them similarly.

URETHRAL STRICTURE.

INTERNAL DILATING URETHROTOMY.

FIG. 2987.—Hunter's Divulsor and Urethrotome.



Hunter's Divulsor and Urethrotome.

"The curved bars dilate but three and one-half inches at a time of the urethra, and therefore the operator can address his efforts to the deeper portions of the canal, without enlarging the meatus. It enables the operator to make tense, longitudinally, any portion of the canal he may desire to incise. Dilatation or incision may be made also in the curved portion of the urethra.

"The blade (*A*) traverses the convexity of the curve from behind forward. It is sharpened on either end, but blunt on its most projecting part, and, therefore, while it will readily cut the resisting bands, it will crowd away without incising the looser tissues.

"A scale of inches, commencing at a point where the knife rises out of the fenestrum which conceals it, extends to the handle, and enables the operator to locate the blade just behind the stricture.

"A similar scale to locate the divulsor is on the other side, and commences at the end of the convex bar. The amount of dilatation is indicated on the handle by sliding scales, in French and American numbers. It is equipped for the dilatation or divulsion of strictures, in all locations, from No. 20, French, up to the normal size of the urethra in its spongy portion, by simply placing the bar (*B*) in the groove prepared for the knife, which it accurately fills, and into which it is securely retained by a hook on one end and a hook and sliding catch on the other.

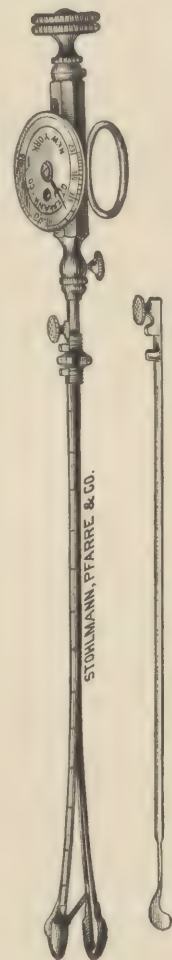
"Having carried the dilatation up to the normal size of the spongy portion, the steel bar (*B'*), on which there is rivetted a glove one and one-half inches long, may be substituted for the bar (*B*). By this means the dilatation can not only be confined to shorter limits, but the stricture can be *over-distended* without interfering with the normal calibre of the canal elsewhere."—Alexander S. Hunter, M. D., in *N. Y. Medical Record*. Nov. 9, 1879.

Dr. F. Tilden Brown, of New York, has given the name of Urethrametome to the instrument (Fig 2989), in which the functions of the bulbous sound, urethrameter and urethratome are all combined in a single instrument. It is passed beyond the stricture closed, the blades are then separated by means of the thumb-screw to the desired width; by now drawing the blade out of its concealment the stricture is cut, the instrument slowly withdrawn, and if any more stricture bands are encountered they are dealt with in like manner.

FIG. 2988 —Young's Dilating Urethrotome.



FIG. 2989.—Brown's Urethrametome.

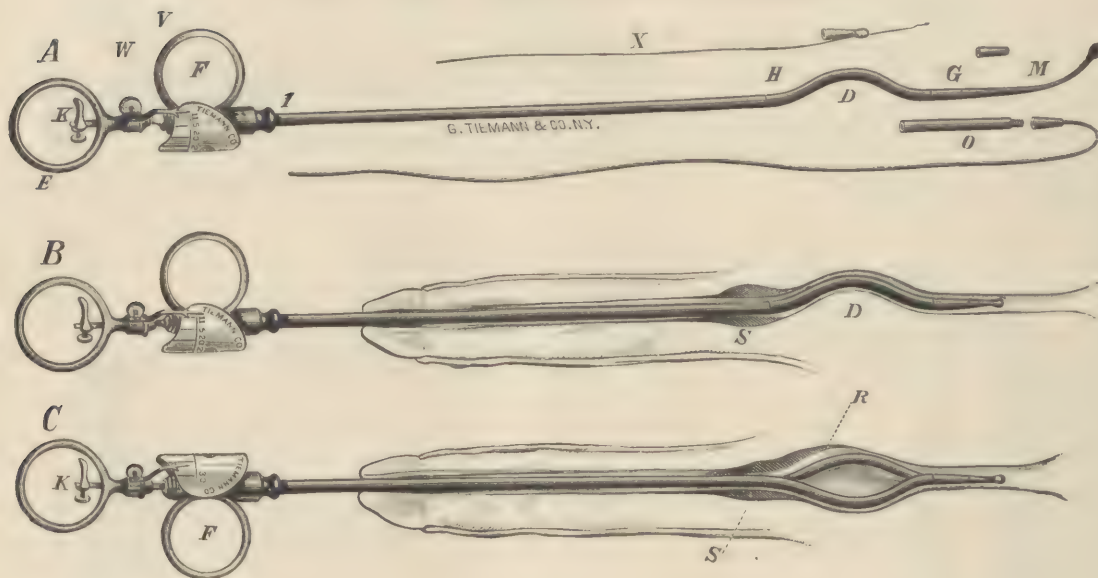


URETHRAL STRICTURE.

INTERNAL URETHROTOMY.

For Locating, Measuring, Dilating and Incising during Withdrawal.

FIG. 2990.—Rogers' Dilating Urethrotome and Urethrometer.



"Fig. A shows the instrument with its points and guides; Fig. B shows its passage along the urethra to the bladder; Fig. C shows it during withdrawal, the bulb which was formed in the bladder, detects the stricture at *S*, while *R* is the blade for incising the stricture.

"Returning to *A*, the instrument will be seen to consist of a shaft, *I H*, a curve, *H D G*, and a curved point, *M*. This point, *M*, may be unscrewed just in advance of *G*, and replaced by the straight point, *O*, to which is attached the soft catgut guide; or, the point, *M*, may be replaced by the short point, tunnelled for the whalebone guide, *X*—after Gouley. The shaft, *I H*, is seven inches long, cylindrical, with a uniform diameter equalling that of No. 4, English scale, while the curve gradually diminishes in diameter to the size of No. 3. The point, *O*, tapers to the filiform guide. Thus we form an instrument which can be safely pressed to the bladder, through any stricture whose opening can be passed by the guide.

"The shaft, *I H*, consists of two cylinders, a *solid* one with ring handle, *E*, inclosed by *hollow* one with ring handle, *F*. Along the curve the two cylinders become *solid half* cylinders, with their flat surfaces opposed, thus forming a *solid whole* cylinder. At *G* the hollow cylinder of the shaft receives the solid one. The instrument having been passed well into the bladder, by means of the ring handle, *F*, the hollow cylinder of the shaft is rotated, causing a separation of the two half cylinders of the curve, thus forming (in the bladder) a *skeleton bulb* of any desirable diameter up to that of the full size male urethra. The diameter of the bulb at any stage of its formation can be seen as the arrow point plays over the meter plate opposite ring handle, *F*. It will be seen in Fig. C that, as the instrument is withdrawn, we approach the stricture at *S* with the point of a wedge whose base corresponds to the greatest diameter of the bulb. With this wedge we keep the stricture well on the stretch. At *R* is seen the blade for incising, and whose handle is at *K*. The blade lies concealed and *sheathed* between the two half cylinders of the curve, and can be made to protrude and cut to the depth of one line or less. This incising may be performed with a *bulb of any size*, and at one razor-like sweep, or by nicking, then dilating and repeating. The latter is preferable, since by this method we cut only through the depth of the cicatrix when the bulb glides on. That it does incise the healthy (?) urethra, both behind and in front of the stricture, may be urged as an objection, which, however, is more theoretical than real, since longitudinal incisions are not followed by contraction of the canal.

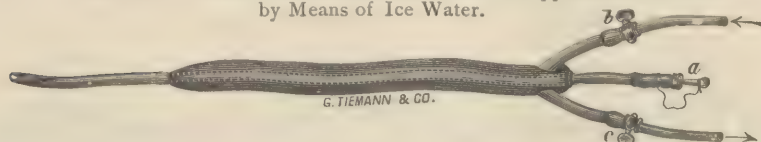
"It is not claimed that a *cure* must necessarily follow *simple incision* with this urethrotome, but it is claimed that the instrument can be safely passed through any urethra admitting the filiform guide; that it detects and locates the stricture during withdrawal; that it stretches or dilates steadily while the blade nicks fibre after fibre of the stricture through its entire thickness. That besides being a urethrometer, it can take the place of a series of conical sounds or dilators, and thus be used in the after treatment.—W. B. Rogers, M.D., in *St. Louis Medical Journal*. April, 1884.

URETHRAL STRICTURE.

INTERNAL URETHROTOMY.

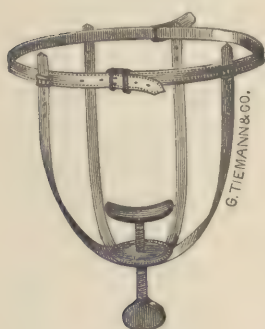
Hæmostatic.

FIG. 2991.—Bates' Urethral Hæmostat, for the Application of Cold by Means of Ice Water.



"Hæmorrhage is not unfrequently an unpleasant accident following operations upon strictures, especially those of rupture and internal urethrotomy. It is not so much to be feared at the time of the operation as at some subsequent period, more particularly after the passage of urine, or on the occurrence of an erection at night. It shows itself usually within three or four days after the operation; but the patient, especially after internal urethrotomy, is not free from this danger for ten days or a fortnight—instances of its occurrence at this late period being now and then met with. Knowing the site of the stricture operated upon, the surgeon will be able to determine very nearly the situation of the bleeding point; moreover, if the latter be in the penile portion of the canal, the blood will flow continuously from the meatus, or, if in the portion of the canal posterior to the bulb, the blood may flow backwards and even distend the bladder with clots.

FIG. 2992.—Otis' Perineal Tourniquet.



"The liability to this accident emphasizes the necessity of keeping the patient quiet, and preferably in the horizontal posture for some days after the operation, and also of his having a faithful attendant. Should hæmorrhage occur it may be controlled by the application of ice to the penis and the perinæum. If obstinate, and the bleeding point be situated in the pendulous portion of the canal, a moderate sized catheter should be introduced and pressure exercised by a bandage encircling the penis. When the source of the bleeding is more deeply seated, pressure may be most conveniently exercised upon the perinæum in the following manner: Place upon the perinæum a pad of

sufficient thickness; tie a bandage firmly around the waist; finally, pass an elastic bandage by a number of turns from behind forwards, and from before backwards, between the buttocks and over the pad, from the waist-bandage behind to the same in front. Dr. Otis has invented the above tourniquet (Fig. 2992) for the purpose and recommends that it should be applied loosely directly after the operation, so as to be tightened in a moment if necessary."—"Venereal Diseases." Bumstead and Taylor. 1879.

FIG. 2993.—Otis' Urethral Hæmostatic Tube.



"In a small proportion of cases hæmorrhage has been quite profuse; not during or immediately following the operative procedure, but coming on after urination, or, more commonly, during erection. Especially from the latter cause, it is sometimes sudden and copious, but readily controlled. The fact that hæmorrhage, of any moment, *ever* occurs, leads me to use and to advise such precautionary measures, in *all* cases, as will give complete security against harm from this accident. My usual plan is to have an intelligent attendant instructed to watch the patient during sleep (when erections are most likely to occur), and to make prompt pressure of the penis at the incised locality. This is usually sufficient to arrest the flow. Applications of ice are also of value for the same purpose. In some cases I have found it necessary to introduce a tube into the urethra, making pressure upon it by means of a light bandage, and to have it retained until the hæmorrhagic tendency has passed. When an attendant is not available a soft rubber tube, one or two sizes smaller than the normal calibre of the canal, may be inserted and retained by a light bandage for one, two or three days, according to the necessities in any given case. If the tube is not worn from the first it may be introduced to protect the surface of the wound during urination, for a day or two. In very sensitive persons I have had the bladder habitually emptied by means of a small soft rubber catheter. An admirable method of arresting hæmorrhage in the pendulous urethra, and especially at or near the meatus urinarius, has been devised by Dr. Geo. K. Smith, Professor of Genito-Urinary Diseases in the Long Island Hospital Medical College. This consists of pressure applied to the sides of the penis by two thin pasteboard splints, an inch or so in width, padded with cotton and encircled, when in position, by half a dozen narrow india-rubber bands. Small notches in the splints keep the bands from slipping and the amount of pressure may be easily regulated by the number or size of the bands. Simple separation of the splints is sufficient to permit urination without removing them."—"Stricture of the Male Urethra." F. N. Otis, M. D. 1878.

URETHRAL STRICTURE.

INTERNAL URETHROTOMY.

Hæmostatic.

FIG. 2994.—Hunter's Urethral Tourniquet.



"To lessen the chief dangers of urethrotomy—hæmorrhage, urinary infiltration and urethral fever. It consists of two curved bars, nine and a quarter inches long, connected on their distal end by a third bar, half an inch in length. They are separated by a screw. When the instrument is closed it measures No. 20, French scale. Its pressure can be limited to the exact extent of the incision. The convex bar is larger than its fellow and nearly round. This rounded surface, when buried in the incision, prevents not only the loss of blood, but also hæmorrhagic infiltration about the edges of the wound. A fenestrum is provided in the short bar, through which the urine may be voided. A septum divides the bore of the large bar—ice water from a fountain syringe may be made to flow in one of the tunnels and return through the other—and, by attaching a rubber tube, it may be conducted into a receptacle. If the instrument be left with the patient, with instructions how to insert it, and how often, he will be able himself to not only thoroughly keep apart the edges of the wound while healing, but will also himself be able to arrest a possible secondary hæmorrhage."—Alexander S. Hunter, M.D. *Medical Record*, November 9, 1878.

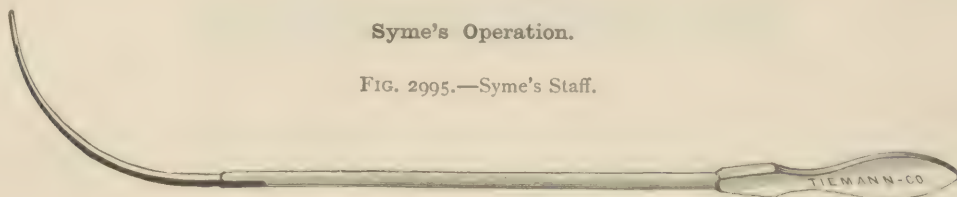
EXTERNAL PERINEAL URETHROTOMY.

The operation consists in cutting the urethra from without inward in the perineal portion, to relieve retention of urine, in case of failure of catheterism and for the cure of stricture.

"External urethrotomy is a valuable operation in selected cases and includes three very different measures; *one*, in which the stricture is divided through the perinæum upon a grooved director passed through the stricture: external division, or Syme's operation; the *second*, in which the urethra is opened in front of the stricture and a grooved probe passed through it into the bladder previous to its division: Wheelhouse's operation and Gouley's method; and, a *third*, in which the perinæum is laid open *without* a urethral guide—the stricture being impervious: Cock's operation.

Syme's Operation.

FIG. 2995.—Syme's Staff.



"Syme's operation is valuable in the highly irritable, as well as contractile stricture, in cases which Syme described as strictures that 'continue to present symptoms after being dilated,' and that 'are indomitable by the ordinary means of treatment.' A grooved staff as large as can be passed through the stricture is first introduced, the patient having been placed upon his back as if about to be cut for stone. The surgeon should then, with perfect precision, introduce his knife into the centre of the perinæum and, at one stroke, cut down upon the groove situated at the lower border of the staff; and, using this as his guide, the perineal portion of the urethra in which the stricture is situated can be readily and freely divided. There are but two important points to be observed in this, the second step of the operation; the first is to be certain that the knife touches the groove of the staff, and, secondly, that the whole of the diseased or strictured portion of the urethra is freely divided. Having succeeded in this, the essential part of the operation, and after a grooved probe or director has been introduced into the bladder through the perineal wound, the sound may be removed, when a full sized elastic catheter can be readily introduced through the penis into the bladder and fixed in; but, if the bladder resents its presence, it may be removed. After the wound has closed, the occasional introduction of a catheter is essential, and 'prudence requires that every patient should learn to introduce bougies to maintain the potency of the urethra.'"—"Bryant's Practice of Surgery." Third Am. Ed. Roberts. 1881.

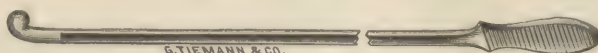
URETHRAL STRICTURE.

EXTERNAL PERINEAL URETHROTOMY WITH CONDUCTOR.

Wheelhouse's Operation.

"The instruments required are: A *special staff* (Fig. 2996), fully grooved through the greater part, except the last half inch, where it stops abruptly and terminates in a rounded button-like end; an ordinary scalpel; two pair of straight-

FIG. 2996.—Wheelhouse's Staff.



bladed forceps, nibbed at the points, ordinary artery forceps and ligatures; lithotomy bandages, sponge, a well grooved and finely probe-pointed director; a straight probe-pointed bistoury; Teale's probe gorget (Fig. 2997), a short silver catheter (No. 10 or 11 gauge) with elastic tube attached.

"*Operation.*—The patient is placed in the lithotomy position, with the pelvis a little elevated, so as to permit the

FIG. 2997.—Teale's Probe Gorget.



light to fall well upon it and into the wound to be made. The staff is to be introduced with the groove looking towards the surface, and brought gently into contact with the stricture, for fear of tearing the tissues of the urethra and causing it to leave the canal, which would mar the whole after-proceedings, which depend upon the urethra being opened *a quarter of an inch in front of the stricture*. Whilst an assistant holds the staff in this position, an incision is made into the perinæum, extending from

opposite the point of reflection of the superficial perineal fascia to the outer edge of the sphincter ani. The tissues of the perinæum are to be steadily divided until the urethra is reached. This is now to be opened *in the groove of the staff, not upon its point*, so as certainly to secure a quarter of an inch healthy tube immediately in front of the stricture. As soon as the urethra is opened, and the groove in the staff fully exposed, the edges of the healthy urethra are to be seized on each side by the straight-bladed nibbed forceps and held apart. The staff is then gently withdrawn, until the button-point appears in the wound. It is then to be turned around, so that the groove may look to the pubes, and the button may be hooked into the upper angle of the opened urethra, which is thus held stretched open at three points—at two by the forceps, and at the third by the hook of the staff. The operator looks into it immediately in front of the stricture, inserts the director into the urethra, and, if he cannot see the opening of the stricture, which is often possible, generally succeeds in very quickly finding it, and passes the point onwards *through* the stricture towards the bladder. The stricture is sometimes hidden among a crop of granulations or warty growths, in the midst of which the probe-point easily finds the true passage. The director having been passed on into the bladder (its entrance into which is clearly demonstrated by the freedom of its movements), its groove is turned *downwards*, the whole length of the stricture is carefully and deliberately divided on its under surface and the passage is thus cleared. The director is still held in the same position and the straight probe-pointed bistoury is run along the groove, to insure complete division of all bands or other obstructions. These being thoroughly cleared, the old difficulty of directing the point of a catheter through the divided stricture is to be overcome. To effect this, the point of the probe-gorget is introduced into the groove of the director, and, guided by it, is passed onwards into the bladder, dilating the divided stricture and forming a metallic floor, along which the point of the catheter cannot fail to pass securely into the bladder. The short catheter is now passed from the meatus down into the wound; is made to pass once or twice through the divided urethra, where it can be seen in the wound, to render certain that no obstructing bands have been left undivided, and is then, guided by the probe dilator, passed easily and certainly along the posterior part of the urethra into the bladder. The gorget is now withdrawn, the catheter fastened in the urethra and allowed to remain for three or four days, the elastic tube conveying the urine to a vessel under or by the side of the bed. After three or four days the catheter is removed, and is then passed daily, or every second or third day, according to circumstances, until the wound in the perinæum is healed, and, after the parts have become consolidated, it requires to be passed still from time to time to prevent recontraction."—C. G. Wheelhouse, Senior Surgeon to the Infirmary at Leeds. 1869-70.

Gouley's Method.

The following description of Prof. Gouley's improved method of external division of the urethra in perinæo, for the relief of obstinate stricture, is extracted from the *New York Medical Journal* for August, 1869.

Operation: The perinæum having been shaved, the patient is etherized. The urethra is explored with a flexible bulbous bougie, of proper size, to ascertain the exact seat of the obstruction. The canal is then filled with olive oil and a capillary probe-pointed whalebone bougie is introduced into the urethra. If its point becomes engaged in a

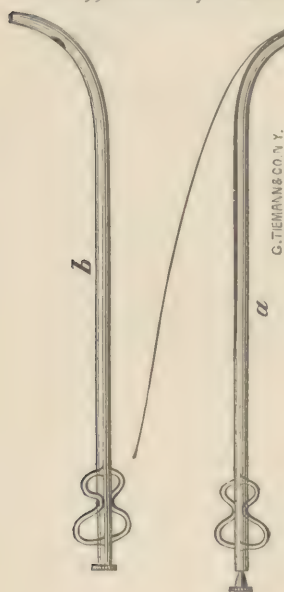
URETHRAL STRICTURE.

EXTERNAL PERINEAL URETHROTOMY WITH CONDUCTOR.

Gouley's Method. (Continued.)

lacuna, it is withdrawn a little, and again carried onward with a rotary movement. If it enters a false passage it is retained *in situ* by the left hand, while another is passed by its side. If this second guide makes its way into a false passage it is to be treated precisely as was the first, and the operation repeated till one guide can be made to pass the obstruction and enter the bladder. Sometimes five or six guides are thus caught before the false passage is filled up and the natural route opened. As soon as a guide enters the bladder—which may be known by the ease with which the instrument may be moved in and out—the other guides are withdrawn.

FIG. 2998.—Gouley's Catheter Staff.



(Teevan calls it 'A conductor which tells the surgeon where it has gone to, so that external urethrotomy can now be performed with a certainty hitherto unattainable, and also extended to desperate cases which were formerly beyond reach.'—*London Lancet*, August, 1874.)

"The next step is to introduce a No. 8 grooved metallic catheter staff, with a quarter of an inch of its extremity bridged over, so as to convert the groove into a canal, the bridged portion itself being also grooved. Its introduction is accomplished by passing the tunnelled point over the free end of the retained guide, then holding the latter steadily between the thumb and index finger of the left hand, and pushing the catheter staff gently into the urethra until its point comes in contact with the face of the stricture. The staff and guide are then kept in position by an assistant, who at the same time supports the scrotum. The patient is placed in the lithotomy position, and held by two assistants, or, better, by Pritchard's anklets and wristlets.

"The surgeon, seated on a low chair, first makes a digital exploration per rectum, to ascertain, as far as practicable, the condition of the membranous and prostatic divisions of the urethra; then he makes a free incision in the median line of the perinaeum, extending from the base of the scrotum to within half an inch of the margin of the anus, involving only the skin and superficial fascia. A few well directed cuts having brought into view the urethra, the operator, with his finger-nail, feels for the groove on the bridged portion of the staff, and opens the canal upon this groove longitudinally, in the median line, exposing to sight the instrument.

A loop of silk is then passed through each edge of the incised urethra, close to the face of the stricture, and held by the assistant in charge of the corresponding limb. When the urethra is opened, and the loops are secured, the catheter staff is withdrawn a little, so as to bring into view the black guide; then the stricture, with about half an inch of the uncontracted canal behind it, is divided. This is best accomplished by means of the Beaked Bistoury, Fig. 3000.

FIG. 2999.—Gouley's Tenaculum (useful in the operation).



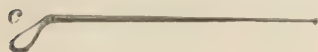
FIG. 3000.—Gouley's Beaked Bistoury.



"It is a very narrow, beaked, straight bistoury, about the size of a small probe, and is made to enter the stricture alongside of the guide, as if it were a probe, and the incision is done by directing the edge downward. The last step is to pass the catheter staff, guided by the whalebone bougie, into the bladder; but, should it be arrested in its course, the knife must be reintroduced and the incision extended further back. The operation is thus completed without unnecessary delay; the bladder is entered with the greatest gentleness, and, by the free flow of urine through the catheter, the surgeon is certain that the instrument has gone in the right direction, that he has divided the stricture thoroughly, and that he has not simply enlarged a false passage.

"Where the initial introduction of the whalebone guide is impossible, it may be passed through the perineal wound into the bladder, and the stricture divided as before; or Fig. 3001 may be used as a guide for the incision and the whalebone bougie then passed along its groove. In either case, with the guide in the bladder after the incision, the point of the catheter staff may be protruded from the wound, the free end of the guide carried through the terminal canal and the bladder entered as before described."—"Diseases of the Urinary Organs." Gouley. 1873.

FIG. 3001.—Arnott's Grooved Probe.



URETHRAL STRICTURE.

EXTERNAL PERINEAL URETHROTOMY WITHOUT A GUIDE.

Cock's Operation.

"*Cock's operation*, tapping the urethra at the apex of the prostate, unassisted by a guide. The only instruments required are a broad double-edged knife with a very sharp point, a large silver probe-pointed director with a handle, and a canula or female catheter, modified so that it can be retained in the bladder.

"The patient is to be placed in the usual position for lithotomy; and it is of the utmost importance that the body and pelvis should be straight, so that the median line may be accurately preserved. The left forefinger of the operator is then introduced into the rectum, the bearings of the prostate are carefully examined and ascertained, and the tip of the finger is lodged on the apex of the gland; the knife is then plunged steadily but boldly into the median line of the perinæum and carried on in a direction towards the tip of the left forefinger, which lies in the rectum. At the same time, by an upward and downward movement, the vertical incision may be carried in the median line to any extent that is considered desirable. The lower extremity of the wound should come to within half an inch of the anus.

"The knife should never be withdrawn in its progress towards the apex of the prostate; but its onward course must be steadily maintained until its point can be felt in close proximity to the tip of the left forefinger. When the operator has fully assured himself as to the relative position of his finger, the apex of the prostate and the point of the knife, the latter is to be advanced with a motion somewhat obliquely, either to the right or left, and it can hardly fail to pierce the urethra. If, in this step of the operation, the anterior extremity of the prostate should be somewhat incised, it is a matter of no consequence.

"The knife is now withdrawn, but the left forefinger is still retained in the rectum. The probe-pointed director is carried through the wound, and, guided by the left forefinger, enters the urethra and is passed into the bladder. The finger is now withdrawn from the rectum, the left hand grasps the director, and along the groove of this instrument the canula is slid until it enters the bladder.

"The operation is now complete, and it only remains to secure the canula in its place with four pieces of tape, which are fastened to a girth around the loins. A direct communication with the bladder has now been obtained and the relief of the patient will be immediate; unless the kidneys have become irretrievably disorganized, we may confidently anticipate a favorable result and the restoration of the urinary organs will be more or less complete, in proportion as the obstructed portion of the urethra is more or less amenable to the ordinary judicious treatment of stricture. The canula may generally be retained in the bladder for a few days, and, if the state of the urine renders ablution necessary, the viscus may be frequently washed out. The canula may then be removed, cleansed and reintroduced. A flexible catheter is sometimes more desirable and congenial to the feelings of the patient than a metallic canula.

"If the previous destruction has not been very great, and if the case progresses favorably, the swelling of the perinæum and scrotum gradually subsides, the induration disappears and the urinary sinuses become obliterated. The urethra may be examined in the ordinary way, to test its permeability, and one may be agreeably surprised to find that the sound or catheter readily passes through the former stricture until it strikes against the canula. An attempt may then be made to introduce a flexible catheter into the bladder, and its passage may, if necessary, be facilitated by passing a director through the perinæum into the bladder, and guiding the catheter along its groove. The urethra once restored to its normal condition and calibre, the artificial opening through the perinæum soon heals up, and, barring the liability of stricture to return if not attended to, the cure may be said to be complete."—"Guy's Hospital Reports." 1866.

"Few operations in surgery are more formidable than this one of perineal urethrotomy *without a guide*. The surgeon who approaches it should be thoroughly at home in the anatomy of the perinæum, and even then should be prepared for possible failure. The patient is tied and held in the lithotomy position, after he has been anesthetized. The scrotum is held out of the way by the assistant. The perinæum having been shaved, an external incision should be made directly in the median line, from two and a half to three inches long. It should be carried down, layer after layer, until the urethra has been opened into upon the end of the blunt staff previously introduced up to the front face of the stricture. The perinæum should be turned toward a window, and a couple of hours of daylight always allowed, in order to have an abundance of time if the operation proves complicated. Haste, in this operation, is bad surgery. After the urethra has been laid open the subsequent steps of the operation are greatly simplified by adopting Avery's suggestion for getting room and light. It consists in transfixing each flap of the wound with a stout ligature about three feet long. The ends of each ligature are knotted, thus forming a long loop on either side, which may be held by assistants. By means of these loops the wound is kept open to the bottom without the necessity of thrusting fingers or spatulæ into the small space, where the fingers of the operator alone are necessary."—"Genito-Urinary Diseases with Syphilis." Van Buren and Keyes. 1874.

Puncture of the bladder, paracentesis vesicæ, is an operation of very ancient date, and has been practiced in various ways to fulfill either temporary or permanent purposes. A history of the proceeding would show that, from time to time, there has been considerable fluctuation in opinion as to the best way of performing it. See "PARACENTESIS," p. 128, "ASPIRATION," p. 129, "TUNNELLING THE PROSTATE," p. 381, "CYSTOTOMY," page 390, &c.

URETHRAL STRICTURE.

PROSTATIC.

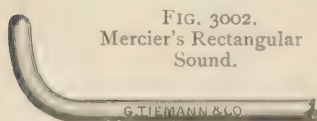
"*Prostate*.—A glandular, cordiform body, of the size of a chestnut, situate before the neck of the bladder, behind the symphysis pubis and surrounding the first portion of the urethra. Its excretory outlets, to the number of ten or twelve, open into the part of the urethra that traverses it, and pours into it a whitish viscid humor (*liquor prostaticus*) intended to lubricate the interior of the urethra and to serve as a vehicle for the sperm in its ejaculation. It is usually described as consisting of three lobes—two lateral and one middle,* fitted in between them on the under side and lying beneath the neck of the bladder and the immediately adjacent parts of the urethra."—DUNGLISON.

HYPERTROPHIED PROSTATE.

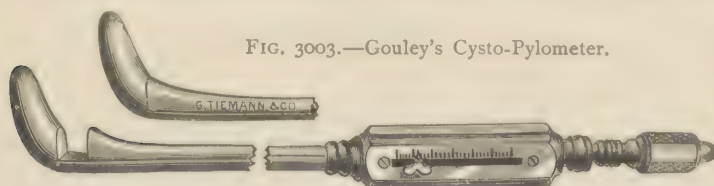
"By *digital examination per rectum* some estimate of the size and consistency of the prostate can be formed, and it is possible to ascertain if this body is harder or softer than normal, if one lobe is larger than the other, if it is nodulated or smooth and uniformly enlarged, if its apex is obtuse instead of being lost in the membranous portion of the urethra, or if there is longitudinal increase.

"The next step in the physical examination of a case of suspected prostatic hypertrophy is to ask the patient to stand up and urinate; if he can urinate spontaneously, the character of the jet of urine will aid to a certain extent in the diagnosis; but it is to be borne in mind that a man who has no prostatic hypertrophy, but contracture of the vesico-urethral sphincter, urinates precisely in the same way as he with enlarged prostate, *i. e.*, in a small, weak and perpendicular stream, suddenly interrupted and soon followed by a succession of drops, perhaps twenty or thirty, to begin again, and to be again followed by the dribbling, or even slobbering, until two or three ounces of urine may be collected in a vessel, without which the patient surely soils his garments or wets his shoes. When the patient has passed all the urine he can void spontaneously, a *soft catheter* is introduced, and the residual urine drawn off, measured and inspected. It may be clear or turbid. The turbidity may be owing to the presence of gravelly substance, of pus, or of both. Such purulent urine indicates cystitis; ammoniacal slimy urine, decomposition of the pus, which proves that the urine has been stagnant for a considerable time. Fetid, slimy, chocolate-colored urine indicates that hæmorrhage has occurred and that the cystitis is in an advanced stage. Residual or stagnant urine in the bladder is then another link in the chain of evidence of prostatic obstruction.

"The physical exploration is further carried on by the use of certain rectangular metallic catheters and sounds, with a view of determining the situation, size or form of the obstruction. To Dr. Mercier belongs the credit of suggesting and first employing the short-beaked, rectangular catheters and sounds for exploring the prostate and bladder, as well as for evacuative catheterism in retention of urine. The advantages of the rectangular beak over all others for the uses to which it is applied are: 1. The extremity of the short beak ($\frac{7}{8}$ inch long) is constantly in contact with the upper urethral wall in the prostatic portion. 2. The blunted heel comes in contact with the obstruction and overrides it easily, while in the case of a long curved instrument the point is presented to the obstacle. 3. The beak can be rotated with the greatest facility when it has entered the bladder, and serves at the same time as a stone searcher and as the means of detecting induration and hypertrophy of the bladder. Thus, by the aid of the rectangular sound, it is possible to diagnosticate intra-urethral hypertrophy of either lobe of the prostate—the deflection of the handle of the instrument indicating the affected side—longitudinal hypertrophy, intra-vesical hypertrophy of one or both lobes, supra-montanal hypertrophy, whether as a crescentic valvule, as a bar, or as a sessile pedunculated tumor or tumors.



it easily, while in the case of a long curved instrument the point is presented to the obstacle. 3. The beak can be rotated with the greatest facility when it has entered the bladder, and serves at the same time as a stone searcher and as the means of detecting induration and hypertrophy of the bladder. Thus, by the aid of the rectangular sound, it is possible to diagnosticate intra-urethral hypertrophy of either lobe of the prostate—the deflection of the handle of the instrument indicating the affected side—longitudinal hypertrophy, intra-vesical hypertrophy of one or both lobes, supra-montanal hypertrophy, whether as a crescentic valvule, as a bar, or as a sessile pedunculated tumor or tumors.



A few years ago it occurred to me that an instrument of still greater precision might be constructed. I accordingly devised the cysto-pylometer, by the aid of which I have been able to measure accurately the thickness of crescentic valvules and of urethro-vesical bars. The beak of this instrument is nearly rectangular and one inch in length. The shaft is in two longitudinal segments, the male segment sliding over the female, and being flat at its vesical end to come in contact with a correspondingly flat surface on the inner side of the beak, and designed to grasp the valvule or the bar. The reverse of the flattened, hollow and quadrilateral handle is graded in centimetres and millimetres, and an indicator is screwed to the male blade.

"*Surgical Treatment*.—The surgical treatment of hypertrophy and its consequences may, with propriety, be divided into two distinct parts. First, that which relates to the mechanical means of relief of obstructed urination and its first consequence, cystitis;† second, that which relates to the removal of the obstruction by operation (*prostatotomy*, *prostatectomy*).

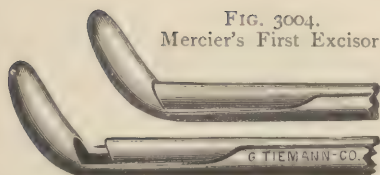
* Some authors allude only to the two lateral lobes.

† See "Retention of Urine, Catheters," page 384, &c.

URETHRAL STRICTURE.

PROSTATOTOMY AND PROSTATECTOMY.

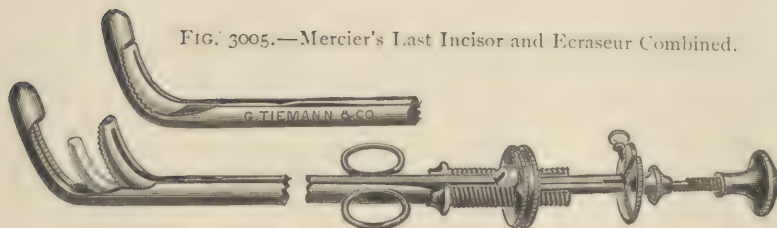
FIG. 3004.
Mercier's First Excisor.



"After a careful study and analysis of the various attempts to relieve prostatic obstruction that had been made by the surgeons who preceded him, Mercier was led to devise instruments to excise a portion of the obstruction and thus make a channel through which the urine could be more freely expelled from the bladder.

"Mercier gave no names to his instruments, except that of incisor and excisor, and to his operations that of incision and excision of urethro-vesical valvules. I have named the instruments *prostatotome* and *prostatectome*, and the operations *prostatotomy* and *prostatectomy*.

FIG. 3005.—Mercier's Last Incisor and Ecraseur Combined.

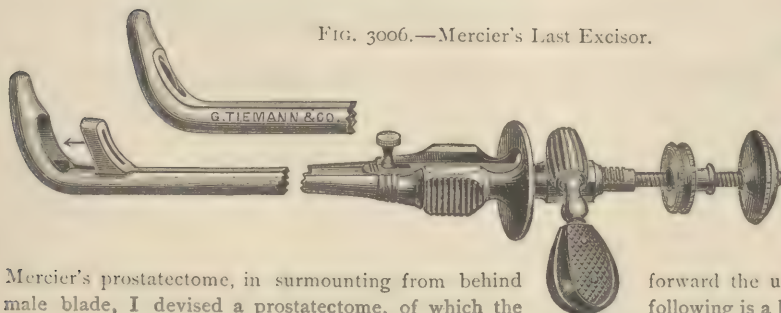


"*Internal prostatotomy* and *prostatectomy* are executed by means of special instruments, not unlike lithotribes in appearance, and introduced in a similar way.

"*External prostatotomy* and *prostatectomy* are preceded by external perineal urethrotomy of the membranous portion. The former is done with a special prostatotome; or, simply with a straight probe-pointed bistoury or a concealed cystotome; the latter with a special prostatectome, or, as in the case of pedunculated tumor, with a small wire ecraseur, or in an isolated intra-mural tumor, by incision and enucleation.

"On account of the difficulty which I have experienced with forward the urethro-vesical obstruction with the following is a brief description.

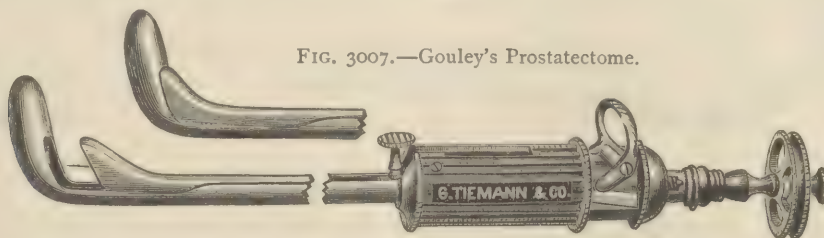
FIG. 3006.—Mercier's Last Excisor.



Mercier's prostatectome, in surmounting from behind male blade, I devised a prostatectome, of which the

forward the urethro-vesical obstruction with the following is a brief description.

FIG. 3007.—Gouley's Prostatectome.



"This instrument resembles an ordinary modern lithotribe, and its mechanism is very simple. It consists of a male and a female blade, the one sliding into the other. The male blade is hollow, its sides are vertical and its superior portion a little rounded. It is welded to a tubular shaft, in the centre of which is a long needle worked by a button, at the proximal extremity of the handle. The object of this needle is to transfix the prostatic valvule or tumor and hold it in position from the moment it is seized till it is cut and extracted, the cavities in the two blades rendering extraction certain. The inclination of the male blade is such that it will ride quite easily over the valvule as a preparatory step to prehension, whereas in Mercier's instrument the same blade is bent so abruptly that it is with the greatest difficulty carried over the valvule, and I have found it impossible in some instances. Again, what in Mercier's *exciseur a hameçon* is a cutting edge, in mine is a flat edge, so that it really acts as an *écraseur*. This instrument will cut or punch out a segment of the valvule, three by nine millimetres. The beak is hollow to receive the piece of valvule, in part at least, and has a small orifice at its extremity, which serves the double purpose of allowing a little water to escape and making sure that the bladder has been reached, and of forcing out any blood oozing from the cut, which might otherwise soon coagulate, fill the cavity and interfere with the proper lodgment of the segment of valvule.

URETHRAL STRICTURE.

PROSTATOTOMY AND PROSTATECTOMY. (Continued.)

The shaft of the female blade is cut sloping for four centimetres to its junction with the beak, so as to give more depth to the male blade. The handle is copied from Colins' lithotribe handle. The instrument is easily dismounted for cleansing by first unscrewing the button which serves to work the needle. Marks, one centimetre apart, on both surfaces of the screw apparatus, indicate the extent of separation of the blades during seizure of the valvule, and consequently its thickness.

"To seize and punch out a piece of the valvule, the instrument is introduced locked, the beak is reversed as soon as it has entered the bladder, and the screw turned from right to left, so as to open the blades or jaws, when the male blade will pass over the valvule and drop in front of it into the prostatic sinus. The instrument, still locked, is moved to and fro, that the operator may know that it is in the proper position; then the needle is thrust through the valvule until its point has entered a shallow pit in the posterior wall within the female blade. The screw is now turned from right to left until there is a slight resistance. The operator, casting his eye upon the handle, at once ascertains the thickness of the valvule which he is about to cut. A few slow turns of the screw which drives the male blade home will complete the section or *écrasement*, with a peculiar crunching sensation, such as is never experienced in any other operation. The instrument, holding the segment in its closed jaws, is pushed into the bladder, and then slowly withdrawn, and a full dose of quinine is given. In the course of half an hour the patient is asked to urinate; failing, his bladder is emptied by means of a catheter. Contrary to Dr. Mercier's injunctions, I have retained a catheter in the bladder for twenty-four hours in some of my cases.

The *after treatment* consists in the introduction of an instrument to make dilatation and depression of the urethro-vesical orifice once every five days to retard the process of cicatrization.

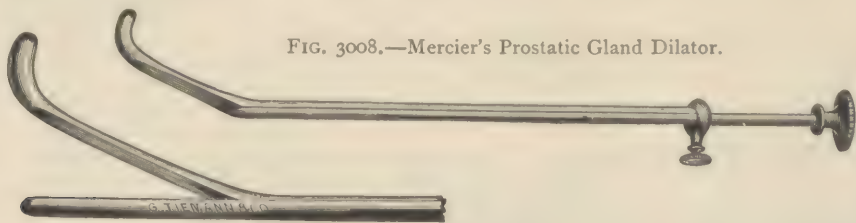


FIG. 3008.—Mercier's Prostatic Gland Dilator.

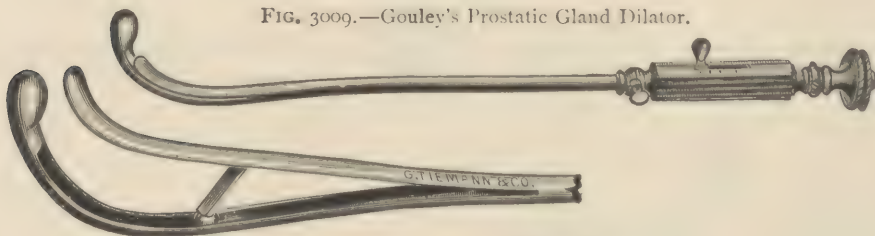


FIG. 3009.—Gouley's Prostatic Gland Dilator.

Indications and Contra-Indications.

"Prostatotomy and prostatectomy, in my belief, should be reserved for cases of crescentic valvular obstructions and bars of not more than a centimetre in thickness. I would give my preference to external prostatotomy over the internal operation in these cases, although I have had recourse to external prostatotomy and prostatectomy in only four of nine cases. As a general rule it is best to perform the operation in the early period of the existence of obstruction to urination; but, under certain circumstances, it is justifiable to operate upon cases where the obstruction has been of long standing, for instance when ordinary catheterism becomes very difficult or impossible. Advanced renal disease is a contra indication. Dr. Mercier has operated successfully upon cases where stagnation of urine had existed seven and nine years. The co-existence of stone is not a contra indication, nor is age; some of Mercier's patients were 74, 76 and 78, one of mine was 76.

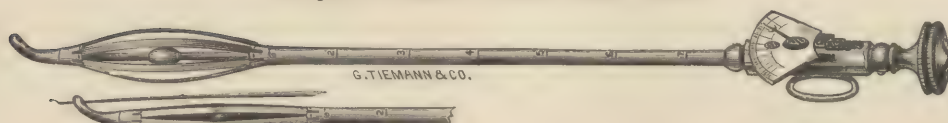
"Pedunculated tumors (which are rare) should be removed by external operation, and, if large, with the aid of a small wire *ecraseur*; if small by clamping them with Mercier's last prostatotome and cutting through the pedicle. Intramural tumors also require external section, followed by enucleation. This method has been eminently successful.

"I doubt if anything can be gained by excising a portion of a large sessile supra-montanal growth, and am disposed to think that a very free central incision would be more serviceable."—"Some Points in the Surgery of the Hypertrophied Prostate." By John W. S. Gouley, M. D., Surgeon to Bellevue Hospital, New York, &c., &c. *Gaillard's Medical Journal*, New York, July, 1885.

URETHRAL STRICTURE.

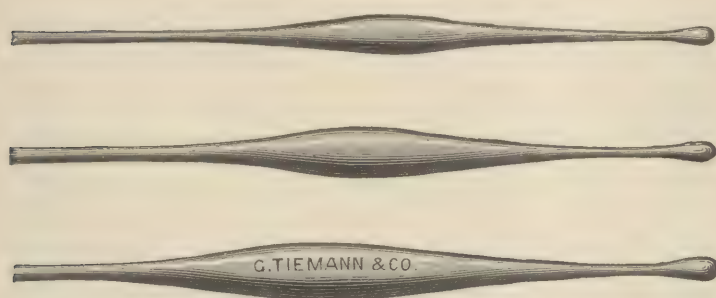
PROSTATIC, DILATORS.

FIG. 3010.—Walker's Prostate Gland Dilator.



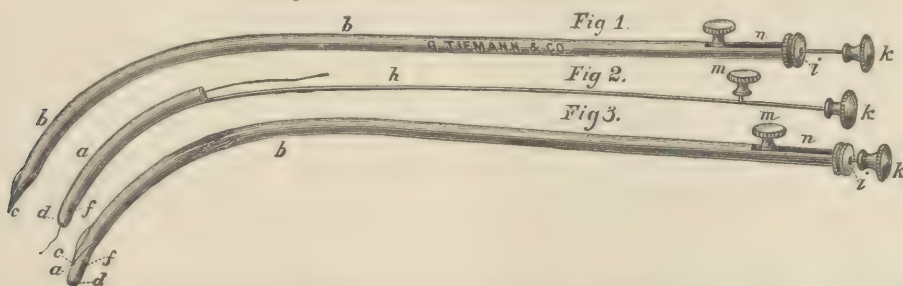
"On the earliest manifestations of prostatic obstruction, mechanical treatment should be resorted to with the same diligence that is required in the treatment of other forms of urethral obstruction. If this be not done, it is only postponing the day until the necessity is greater and the difficulty more apparent. There are at least two conditions of the enlarged prostate which are unattended with obstructed micturition, where either channels are formed between the masses of the growth, or the line of the urethra remains unaltered. These conditions may be artificially produced to an extent capable of being useful. For this purpose I have recently devised some specially adapted bougies which I use. They are gum elastic, from two to four inches longer in the stem

FIG. 3011.—Harrison's Prostatic Dilators.



than the ordinary instruments, and have an expanded portion, an inch from the tip, which is made to enter the bladder. If dilatation be not too rapidly proceeded with, no irritation will be aroused; on the contrary, irritability will subside by reason of the completeness with which the bladder is emptied. Where there is residual urine, catheters of a similar shape may be substituted, thus allowing any water to be drawn off, whilst at the same time the prostate is subjected to dilatation."—"International Cyclopædia of Surgery." Reginald Harrison, F. R. C. S., Ashhurst. Vol. VI., 1886.

FIG. 3012.—Fitch's Dome Trocar Catheter.



"To Tunnel the Prostate.—The instrument, with the dome fully protruded, as in 3, and fixed by the thumb-screw (*m*), is introduced by the urethra till the dome (*d*) is stopped by the enlarged prostate, where it is to be firmly held while the forefinger of the left hand steadies the prostate; then the thumb-screw (*m*) is loosened, and the tips of the fingers and the thumb of the right hand grasp the outer canula (*b*), 3, and press it quickly forward. If now the instrument does not promptly advance, let the right thumb-nail catch the end of the outer canula at *i*, and push it onward while the inner side of the right middle finger makes counter-pressure on the distal edge of the thumb-screw (*m*), or an assistant may pull out the disk (*k*) so as to retract the dome, especially taking care that while the inner tube is being retracted the outer tube is to be pushed boldly onward, when the cutting point (*c*) 1, of the outer tube will pass easily through the prostate into the bladder, and urine escaping at *i* will show that the bladder is entered and the operation completed. Then, the dome being protruded by pressing home the disk (*k*) and fixed by tightening the screw (*m*), the instrument again becomes a harmless catheter, giving full flow to the urine through the fenestra (*f*), and may be retained in the bladder twenty-four hours, or until the perforation is sufficiently patulous, shown by the instrument moving easily in it; then it may be withdrawn, and a full-sized metal catheter introduced twice a day till the new channel is permanently established. It may also be used for supra-pubic puncture, rectal puncture of the bladder, and for tapping ovarian cysts *per vaginam*."—*The New York Medical Journal and Obstetrical Review*, February, 1882.

URETHRAL AND URO-CYSTIC.

BLADDER, VESICA URINARIA, CYSTIS, UROCYSTIS.

Anatomy and Physiology.

"*Bladder*, a musculo membranous bag, cyst or pouch, which serves as a reservoir for the urine secreted in the kidneys. It is called *vesica urinaria*. The bladder is situated in the pelvis, immediately behind the symphysis pubis and in front of the rectum in the male; in front of the uterus and vagina in the female. Thus placed in the lowest portion of the trunk in front, it communicates by means of two long tubes, called *ureters*, with the two kidneys, placed high up in the back, just above the lumbar region, on each side of the vertebral column. It communicates with the exterior by means of a single tube called the *urethra*, through which the urine is voided. In infancy it is of a pyriform shape, and situated almost entirely in the abdomen; it undergoes a change of form in the adult, and sinks deeper in the pelvic cavity. It then assumes the shape of a short oval, compressed in its anterior and posterior walls; its lower surface expands on the rectum and forms what is termed by anatomists the *bas fond* of the bladder. In the female its transverse diameter is greater than it is in the male, owing to the position of the uterus and vagina between the bladder and the rectum. It increases in dimensions with advancing age, and is larger in females than in males, probably from habitual distention, arising from constraint. The direction of the bladder is oblique, being inclined forward and upward. It is retained in position by ligaments. Anatomists have divided it into six regions or surfaces, for the facility of description and surgical operation; these are named anterior, posterior, superior, inferior and left and right lateral. The anterior surface lies behind the symphysis pubis, with which it is connected by loose connective tissue. When distended the bladder rises, and its anterior surface comes in contact with the recti muscles of the abdomen. The posterior surface is covered by the peritoneum, which is reflected upon it from the rectum in the male and from the uterus and vagina in the female. The lateral and superior regions are partially covered by the peritoneum. The inferior region, or *bas fond*, is the most important in a surgical point of view. It is bounded before by the *prostate gland* and behind by the peritoneum. Attached to it in the male we find the *vesicula seminalis* and the *vasa deferentia*, which converge to the prostate gland, leaving a triangular space, where the bladder is only separated from the rectum by a quantity of fatty connective tissue surrounding numerous small vessels, chiefly veins. In the female this region rests on the vagina, which separates it from the rectum. The anterior and inferior regions of the bladder being left uncovered by folds of the peritoneum, the surgeon is able to perform operations on those parts without injuring that membrane, which is so liable to dangerous inflammation from wounds. The walls of the bladder are composed of three layers or coats, united by connective tissue: an internal or mucous membrane, a middle or muscular coat, and an external or serous coat, formed by folds of the peritoneum. The muscular coat is composed of pale fibres interlacing in all directions, and enabling the bladder to contract so perfectly as to expel every drop of its contents. The neck of the bladder differs in structure from the rest of the organ, being composed of a somewhat fibrous whitish substance, and forming a connecting medium between the bladder and the urethra. Its posterior part rests upon the rectum; its anterior is surrounded below and at the sides by the *prostate gland*, which is peculiar to the male. This gland is composed of an aggregation of mucous follicles, forming three lobes, one on each side of the neck of the bladder and one below, communicating by means of small ducts with the urethra. The inner coat or lining of the bladder, being a portion of the genito-urinary mucous membrane, not only lines the bladder, but is prolonged upward through the ureters into the kidneys, and downward along the urethra. It is of a pale rose color, with a smooth surface when the bladder is distended, and corrugated when empty. This membrane secretes a viscid fluid termed mucus, which protects it from the acrimony of the urine with which it would otherwise be in contact. The secretion of the urine is performed by the kidneys, which are constantly active, without any apparent alteration of action and repose, although within a given period they do more work at one time than another. The urine thus secreted dribbles incessantly along the ureters, and drops into the bladder, where it accumulates until the walls are distended and a general uneasy sensation is produced, which calls for an evacuation of the contents. Congenital malformations of the bladder are not unfrequent. Sometimes it is altogether wanting, and in such cases the ureters empty into the rectum, as into the cloaca of birds, or at the pubes, or directly into the urethra. A still more frequent malformation is that in which, the lower portions of the recti muscles being imperfect, and the anterior wall of the bladder deficient, the posterior wall is protruded (extrophy) and forms a red fungus-like tumor above the pubes. The tumor presents two orifices, which are the mouths of the ureters, from which the urine constantly dribbles. Blasius describes a case in which the bladder was double. Molinetti, it is said, found in a female subject five kidneys, five ureters and five bladders. Inflammation may affect the coats of the bladder singly or together. When the mucous membrane is inflamed there is a sense of irritation and a constant desire to discharge the contents. Ulcers, gangrenous spots and indurations of various kinds may be produced by inflammation. The secretion of the mucous membrane may be increased or altered, constituting what is termed catarrh of the bladder. The mucous membrane is sometimes found in a varicose state. In other cases it gives origin to cysts of different kinds, and fungous growths; the latter occur mostly in old people. Various accidents and diseases may prevent the bladder from evacuating its contents, in which case it becomes excessively distended, and unless relieved inflammation ensues, a portion mortifies, through which the urine escapes into the abdomen, and speedy death is the result. After three days' retention the bladder usually at-

URETHRAL AND URO-CYSTIC.

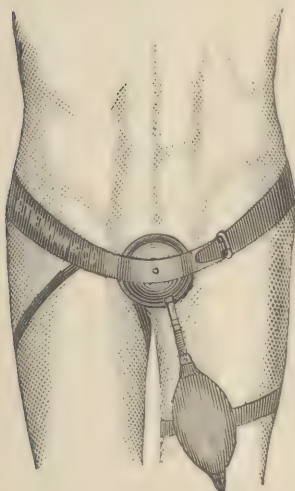
BLADDER, VESICA URINARIA, CYSTIS, UROCYSTIS.

Anatomy and Physiology. (Continued.)

tains its utmost limit of distention, and if not relieved the contents are evacuated in small quantities, as they would be in a case of mere *incontinence* of urine; and it is of great importance, therefore, not to mistake *retention* for *incontinence* where there is this point of similarity in their respective symptoms. When there is danger in delay, and a *catheter* cannot be introduced, the bladder must be *punctured*, either through the perinæum or the rectum, or above the pubes, as it is not covered by the peritoneum in these regions. Where urinary calculi exist in the bladder they are removed by surgical operations."—"American Cyclopædia."

Extrophy. Incontinence of Urine.

FIG. 3013.
Tiemann's Instrument for
Extrophy of Bladder.



Tiemann's instrument for everted (extrophy of) bladder consists of a metallic or hard rubber shield, to the lower extremity of which is attached an elastic tube, leading to a soft rubber pouch, to collect the urine. This is buckled to the thigh, or may be carried down to the boot.

Urinals for Incontinence.

FIG. 3014.



FIG. 3015.



FIG. 3016.



We have various other patterns, for males and females, of English, French and American make.

FIG. 3017.—Van Buren and Keyes' Hot Water Bag, for Diseased Prostate.

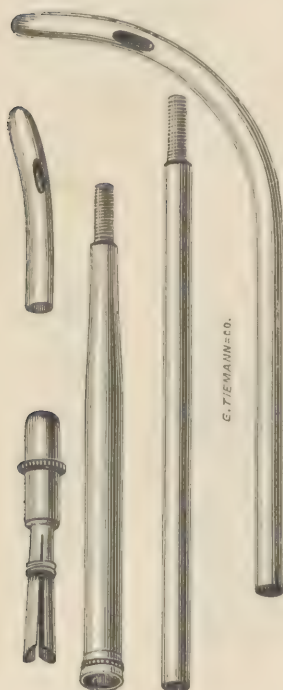


"When cystitis, accompanying enlarged prostate, becomes considerable enough to require the use of anodynes, the recumbent position should be insisted upon. The patient should lie upon his back with a hair pillow under his hips, so that they may be raised higher than his shoulders, in this way relieving the bladder from some of the intestinal pressure, and favoring a drainage of venous blood from the pelvis. The head may be raised, but the shoulders must be low. The skin of the hypogastrium should be kept slightly reddened by the application of a hot, light poultice, containing a sprinkling of mustard, or more neatly by the use of moistened mustard paper, and a flat rubber bag, containing hot water, which may be laid upon it. Heat, applied also to the perineum, is agreeable to the patient. To meet the demand of heating the perineum and hypogastrium at once, there has been constructed a rubber bag with a long hollow prolongation to pass between the thighs, the whole to be fastened on by suitable straps and to be filled with hot water. These bags afford great comfort. The rectum should be kept empty by the daily use of a hot enema. Water, as warm as can be borne in the rectum, often exercises a decidedly soothing effect upon the inflamed bladder."—"Genito-Urinary Diseases with Syphilis." Van Buren and Keyes. 1874.

URETHRAL AND URO-CYSTIC.

RETENTION OF URINE.

FIG. 3018.
Parker's Compound Catheter
and Caustic Holder.



"A disease in which the urine accumulated in the bladder cannot be evacuated, or, at least, cannot be passed without extreme difficulty. In the former case the retention is said to be *complete*; in the latter, *incomplete*. Many writers have distinguished three degrees of this affection, to which they have given the names *dysury*, *strangury* and *ischury*. Retention of urine may depend upon loss of contractibility, paralysis of the bladder, &c., or on some obstacle to the passing of the urine, as in cases of pressure of the womb on the bladder, of tumors in its vicinity, foreign bodies in its cavity, inflammation of the urethra, swelling of the prostate, stricture, &c. The pain is extremely violent, and the bladder may be found distended above the pubis. The treatment consists in *introducing the catheter or puncturing the bladder*, and in combating the cause which has produced the retention by particular means adapted to each case."—DUNGLISON.

Evacuative Catheterism.

"*Triangular Ligament*.—In a thin perinæum we can feel the lower border of the deep perineal fascia or the so-called triangular ligament of the urethra. The urethra passes through it about one inch below the lower part of the symphysis pubis, and about three-quarters of an inch higher than the central tendon of the perinæum. It is important to bear in mind these landmarks in introducing a catheter. If the catheter be depressed too soon, its passage will be resisted by the triangular ligament; if too late, it will be likely to make a false passage by running through the bulb.

"*Introduction of Catheters*.—Keep the point of the instrument well applied against the upper surface of the urethra; depress the handle at the right moment; keep the umbilicus in view; in cases of difficulty feel the urethra through the rectum, to ascertain whether the instrument be in the right direction. Attention to these rules diminishes the risk of making a false passage, an injury which under great delicacy in manipulation ought never to happen."—"Gray's Anatomy."

"*Retention* in a child is generally from stone impacted in the urethra; in an adult from stricture; and in an old man from prostatic disease."—"Bryant's Practice of Surgery." Roberts. 1881.

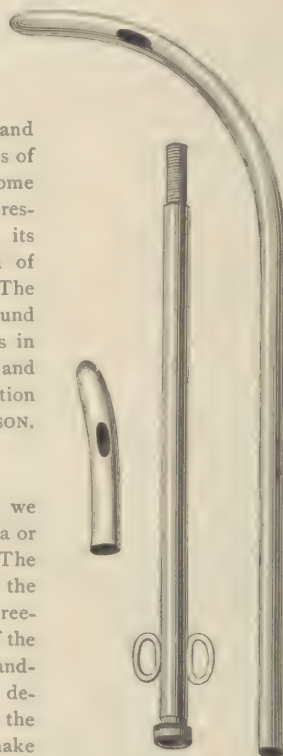
"The most common form of obstruction of the bladder, productive of *retention of urine*, is hypertrophy of the prostate gland. The enlargement may involve the entire organ, or it may be limited to one of its lateral lobes, or even to its mamillary process.

"Great obstacle to micturition, and even retention of urine, may be caused by centric enlargement of the prostate, without any material increase of weight or bulk of the lateral lobes. The tendency of such a development is to encroach upon and diminish the calibre of the corresponding portion of the urethra, and, consequently, to interfere more or less with the evacuation of the urine and the passage of instruments.

"*The treatment is by the catheter*, and one of silver is generally far preferable to one of gum elastic. It should be at least twelve inches in length, and with a curve forming an arc equal to one-third of the circumference of a circle five inches and a half in diameter, otherwise it may fail to reach the distended reservoir."—"System of Surgery." Gross. 1882.

In regard to mechanical means of relief of obstructed urination and its first consequence, cystitis, Dr. Gouley says: "Permit me to say a word about catheters, and first let me urge that all rigid catheters be discarded, except in cases of false routes. The promiscuous and careless use of rigid instruments, whether metallic or non-metallic, is almost certain to lead to the infliction of wounds in the urethra, either at the bulbo-membranous region or in the prostatic sinus, and these rents soon after may be converted into troublesome false routes, which often render further catheterism of the bladder impossible and place the patient's life in great jeopardy. Even when used with the greatest caution, rigid catheters do much mischief."—"Some Points in the Surgery of the Hypertrophied Prostate," *Gaillard's Medical Journal*. New York: July, 1885.

FIG. 3019.
Male and Female Catheter.

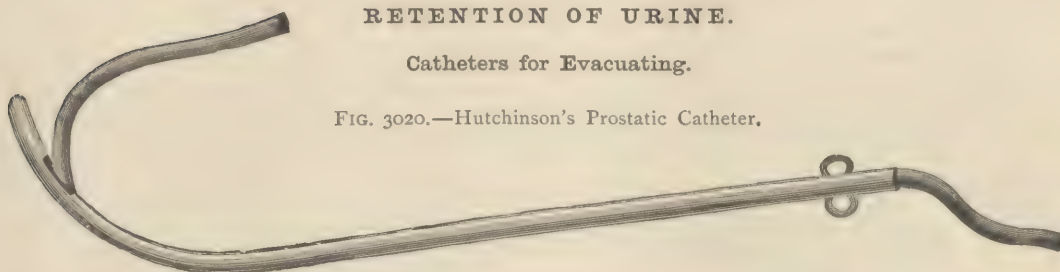


URETHRAL AND URO-CYSTIC.

RETENTION OF URINE.

Catheters for Evacuating.

FIG. 3020.—Hutchinson's Prostatic Catheter.



A silver prostatic catheter, with a large eye in its concavity, permitting of the introduction of a portion of india rubber tube through it. After introducing the tubing into the bladder, the catheter is withdrawn, and a small nozzle, with rings, is introduced into the end of the india rubber tube to allow of its being fixed to the penis. A stiletted plug for the nozzle, intended in the first place to plug its orifice, and in the second to stiffen the first three inches of the tube, will prevent its being bent and expelled. The nozzle, having been passed into the meatus, is fastened firmly to the penis by means of tapes and plaster.

FIG. 3021.—French Gum Prostatic Catheter.

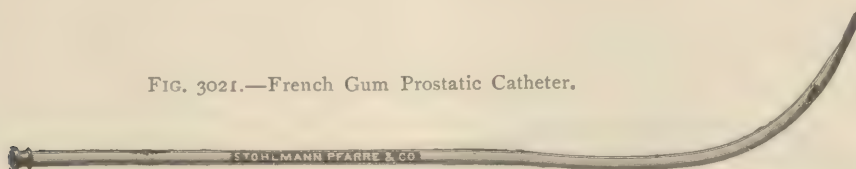


FIG. 3022.—Olivary Gum Catheter.



FIG. 3023.—French Olivary Gum Catheter.

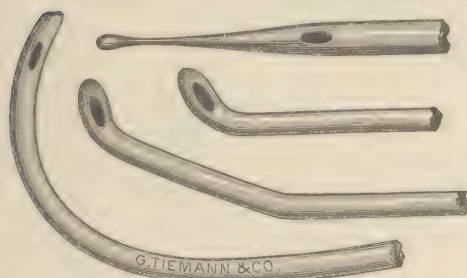


FIG. 3024.—Mercier's Elbowed Catheter.

FIG. 3025.—Mercier's Double Elbowed Catheter.

FIG. 3026.—Curved Gum Catheter.

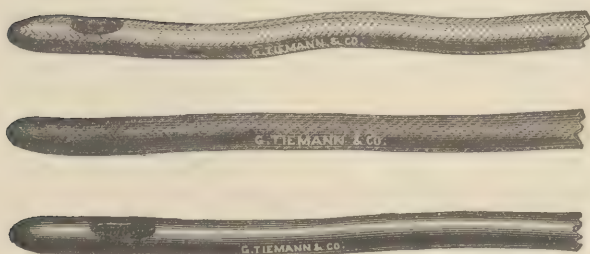
"French gum elastic catheters with a conical and bulbous joint are often of value on account of the ease and safety of their introduction. They are admirably fitted for a patient's own use, since their flexibility renders it almost impossible for him to do himself harm."—"Venereal Diseases," Bumstead and Taylor, page 284. 1879.

"Mercier's elbowed catheters (single or double curves) have fixed angles so as to override obstructions in the floor of the urethra, such as posterior median hypertrophy. The point follows the roof of the canal or strikes any obstacle upon its inclined surface, and at an angle which allows the instrument to ride over the obstruction. For difficult cases these catheters are invaluable."—"Genito-Urinary Diseases," Van Buren and Keyes.

"The patient should be cautioned against using gum catheters which are at all worn or cracked, or whose eyes are deformed by use, as the slightest inequality in the instrument causes pain and irritation and even erosion of the urethral mucous membrane. Orchitis, which is by no means an infrequent consequence of often repeated catheterism, is also traceable to the use of defective or worn out catheters."—"Diseases of the Urinary Organs." Gouley. Page 287. 1873.

The English *yellow* elastic catheters are stiffer than the French—black—more durable and easier to keep. The French will stick together in hot weather unless freely powdered with soap-stone dust and kept in a cool place.

FIGS. 3027, 3028, 3029.
English Silk Webb Catheters.

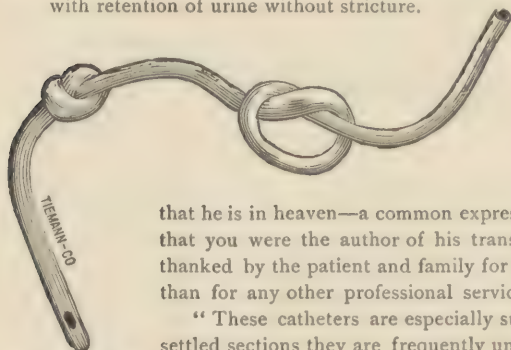


URETHRAL AND URO-CYSTIC.

RETENTION OF URINE.

Catheters for Evacuating.

FIG. 3030.
Vulcanized India Rubber Catheter, for old men affected with retention of urine without stricture.



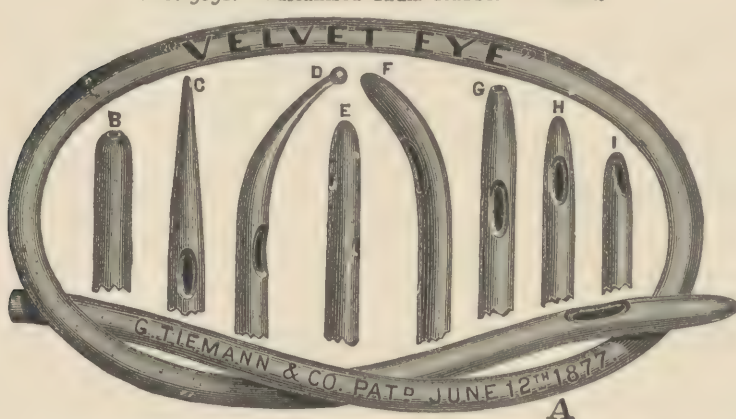
This flexible instrument, even in cases where there exists considerable enlargement of the prostate, seems to find its own way in the urethra with the utmost facility. It causes less irritation than others when left in the urethra. The latest improvement is Tiemann & Co.'s Velvet Eye Catheter.

"Sir Henry Thompson says: 'If, after twenty-four hours of agony, relief follows your dextrous use of the catheter, and the two or three pints which the patient was unable to void are withdrawn by your hand, he tells you

that he is in heaven—a common expression with such patients; and he will never doubt for a moment that you were the author of his translations.' I have repeatedly been more warmly and gratefully thanked by the patient and family for relieving, by the use of soft catheters, the retention of urine than for any other professional service.

"These catheters are especially suited to the wants of country practitioners, where in sparsely settled sections they are frequently unable to see the patient suffering with retention from prostatic obstruction, and atony from over distention or paralysis of bladder, more than once in twenty-four hours, when in that length of time the operation should have been repeated three or four times. You can easily instruct these

FIG. 3031.—Vulcanized India Rubber Catheters.



patients to relieve themselves with one of them. Thus the great advantage to that class of practitioners is evident."—Joseph W. Thompson, M.D., Paducah, Ky. *American Practitioner*, August, 1877.

"When catheterism is to be intrusted to inexperienced persons, to nurses, or to the patients themselves, the *soft india rubber instruments* are unquestionably the safest. One of the prime requisites of a good catheter is an eye as small as practicable, with perfectly smooth, rounded edges. It should never have two eyes. Nearly all those who practice auto-catheterism have a predilection for small cath-

eters, such as Nos. 4, 5, 6, English. This is a grave error. The catheter should seldom be under No. 9, which, though it may be pliable, retains a certain degree of firmness and can be much better managed."—GOULEY.

FIG. 3032.—Keyes' Catheter Guide.



FIG. 3033.—Otis' Prostatic Guide for Soft Rubber Catheters.
To impart increased firmness to, without impairing the elasticity of soft rubber catheters.



FIG. 3034.—Catheter Holder.



It is made of flat bands of rubber; where the bands cross over the meatus they are perforated by a minute hole, this being very elastic holds the instrument passed through it, while the strap of the muzzle is passed around the body of the penis.

URETHRAL AND URO-CYSTIC.

RETENTION OF URINE

Catheters for Evacuating.

FIG. 3035.—Squire's Vertebrated Catheter.

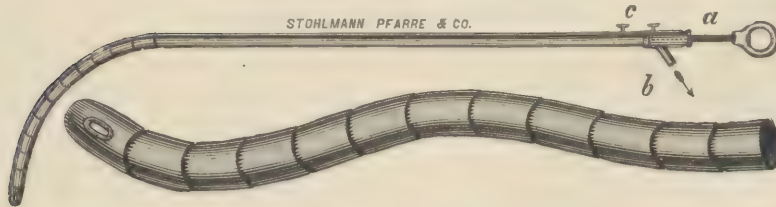


FIG. 3036.—Cowan's Vertebrated Catheter.

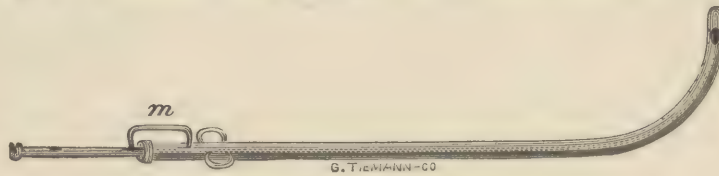
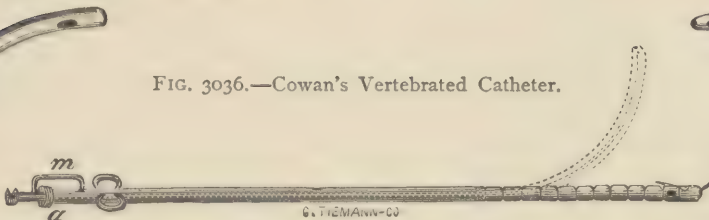


FIG. 3037.—Rubber Bag and Stopcock for Injecting.

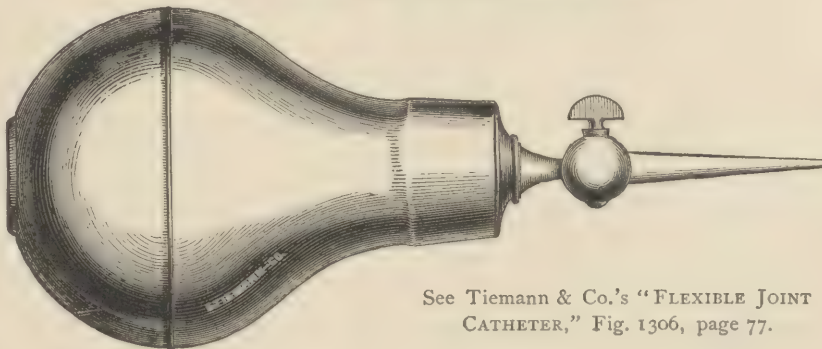


FIG. 3041.—Gross' Flexible Catheter.

See Tiemann & Co.'s "FLEXIBLE JOINT CATHETER," Fig. 1306, page 77.

FIG. 3038. Warren's Door Catheter, for Evacuating the Bladder.

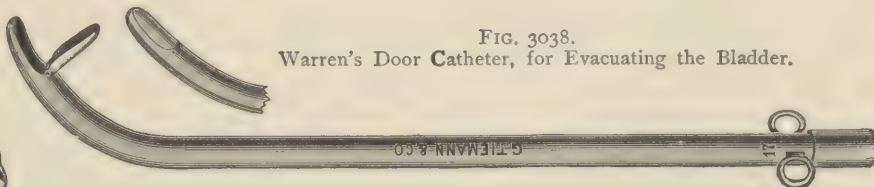


FIG. 3039.—Warren's Vermicular Catheter.



FIG. 3040.—Huter's Flat Catheter.



FIG. 3041.—Gross' Flexible Catheter.

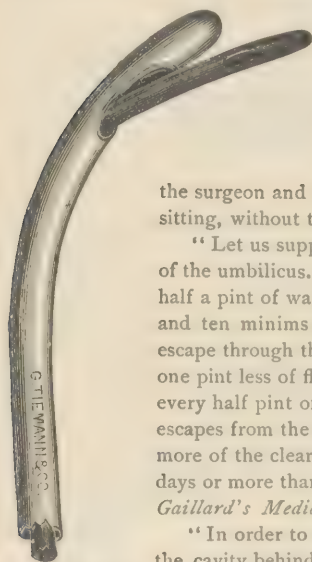


URETHRAL AND URO-CYSTIC.

RETENTION OF URINE.

Catheters for Evacuating.

FIG. 3042.
Mercier's Invaginated Catheter.



"In cases where ordinary catheterism has been impracticable, owing to very large supra-montanal tumors, or false routes, the invaginated catheter of Mercier is almost certain to be successful. On five or six occasions, having entered the bladder with the male part of the invaginated catheter, I gradually and cautiously pushed together onward into the bladder both the male and the female portions of the catheter and thus made free and complete divulsion of the false route.

"*Evacuative Catheterism* cannot be employed too soon in the management of prostatic obstruction. But there are cases where it would be most unwise in the surgeon and often fatal to the patient to withdraw *all* the urine retained in the bladder at one sitting, without taking certain steps which I shall presently describe.

"Let us suppose a case in which the bladder is distended so that its fundus rises above the level of the umbilicus. A catheter is introduced and one pint of urine is slowly drawn off. Immediately half a pint of warm borax solution—two grains to the ounce, with five minims of wintergreen essence and ten minims of glycerine to the ounce—is thrown in, then another pint of urine is allowed to escape through the catheter, and half a pint more of the borax solution is injected. There is already one pint less of fluid in this bladder, and what remains is mixed with a disinfectant. After this, for every half pint of diluted urine drawn off, half a pint of borax solution is injected until the fluid that escapes from the catheter is perfectly clear. Once every four hours afterwards half a pint or a little more of the clearer contents is removed, until the bladder is entirely empty, which may take several days or more than a week."—John W. S. Gouley, M.D., Surgeon to Bellevue Hospital, New York. *Gaillard's Medical Journal*. New York: July, 1885.

"In order to empty the bladder *entirely*, it is necessary, as the point of the catheter can not reach the cavity behind the gland, to raise the patient's hips, or to turn him on his belly, so as to force the urine out of its hiding place; or instead of this a Squire's vertebrated catheter or the coiled silver catheter of Dr. S. W. Gross (page 387) may be used."—"System of Surgery." Gross.

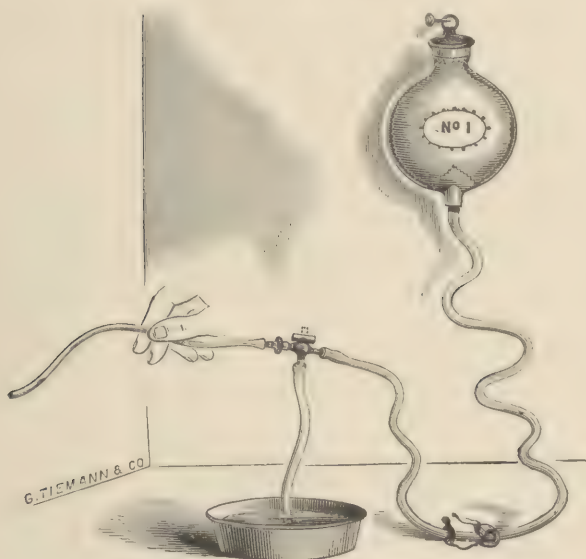
IRRIGATION OF THE BLADDER.

"The washing out of an hypertrophied and dilated bladder, where the mucous membrane is habitually congested and secreting an over-supply of mucus, is a point of treatment of cardinal importance. By this means the last drops of residual urine, with the pus and stringy mucus which they contain, are diluted and drained away, and no ferment is left behind to decompose the healthy fluid as it comes down the ureters. The formation of stone is prevented, and the congestion existing around the neck of the bladder is soothed and kept from any aggravation which would increase the irritability, that distressing symptom so closely linked with the pathological changes incident to enlarged prostate. The best method of washing out the bladder is as follows: The soft catheter through which the residuum has been drawn off is used. A double current catheter is not advisable, for with such an instrument no distention is brought to bear upon the bladder-walls, and the whole mucous surface is not brought into contact with the cleansing fluid. Warm water should be used, since it is soothing as well as cleansing, and does not excite the bladder to speedy contraction upon being thrown into its cavity. A temperature of about blood heat should be aimed at—a little below 100° Fahr. The best style of syringe is a rubber bag holding about four ounces, provided with a nozzle tapering to a fine point (Fig. 3037), so that it may readily enter the calibre of any catheter, and with a stop-cock which works smoothly for convenience of manipulation. The bag is filled by exhausting the air and inverting it into the vessel containing the water. By removing the nozzle from the water and slightly compressing the bag, with the nozzle held uppermost, whatever air remained within it will be first expelled and then the water will get out. Now the stop-cock is to be turned and the nozzle once more submerged, the stop-cock being again turned on. The bag will now fill itself completely and there is a certainty of no air being present in it. Finally, the stop-cock is turned off, the nozzle being still under water, and the bag is ready for use. At this stage of the operation the patient (or surgeon) introduces his soft catheter and drains off the residual urine. As soon as the last drops have been evacuated, the nozzle of the bag is gently inserted into the catheter and the stop-cock once more turned on, while gentle continued pressure with the hand is applied to the bag, forcing its contents in a steady stream into the vesical cavity. As soon as a slight feeling of distention is experienced by the patient, the bag is removed and the injected fluid allowed to drain off. A second washing is executed in the same manner, and perhaps a third, until the water which flows out is nearly or quite clean. These simple manipulations are easily learned by a patient and often constitute the only treatment which his case requires."—"Genito-Urinary Diseases with Syphilis." Van Buren and Keyes. 1874.

URETHRAL AND URO-CYSTIC.

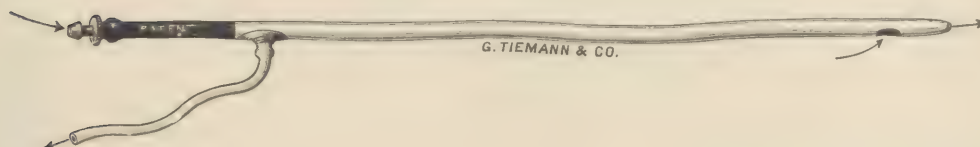
IRRIGATION OF THE BLADDER.

FIG. 3043.—Keyes' Irrigator.



To the fountain-syringe bag holding a pint, and tube of variable length, so as to allow, if desirable, considerable pressure by elevating the bag, is attached a two-way stop-cock. Upon the tube is another stop-cock only useful when it is desired, having thrown a medicated solution into the bladder, to retain it there for a certain length of time, without either allowing the bladder to become over full or its contents to escape. The nozzle of the nicked stop-cock is very large, nearly a quarter of an inch in diameter, and fits snugly into the expanded conical (also nicked) mouthpiece. It is so large, and fits so easily, that the most clumsy fingers can readily adjust it almost unaided by sight. Upon this conical catheter mouthpiece is fitted a thin piece of rubber tubing covering its upper two-thirds. This allows the mouthpiece to be used with any metallic or other hard catheter, and prevents leakage. The fine conical point of the mouthpiece is to be screwed into any soft catheter before introducing the latter. The other branch of the two-way stop-cock is fitted into a short piece of rubber tubing which conveys the urine and the washings into some convenient receptacle.

FIG. 3044.—Soft Rubber Double Current Catheter.



"Tiemann & Co., of New York, have improved the smaller varieties of these tubes (those numbers suitable for use in the male bladder) by furnishing a probe point and the 'velvet eye' peculiar to their excellent catheters. This enables the instrument to be made smaller, since the direct current requires only a small stream. The efferent tube is relatively larger, and thus overstrain upon the bladder is prevented. At my suggestion, attachments have been made so that the tubes may be lengthened at will. As now made and sold by Messrs. Tiemann & Co., these tubes appear very nearly perfection."—*The New York Medical Journal*. H. O. Marcy, M. D., Boston.

FIG. 3045.—Double Current Catheter.

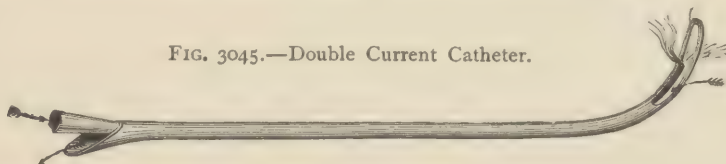
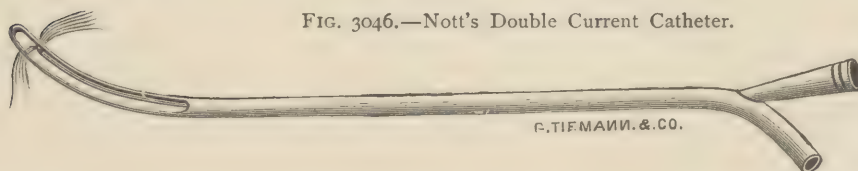


FIG. 3046.—Nott's Double Current Catheter.



Vesical injections are used for the purpose of simply cleansing the bladder, of decomposing phosphatic concretions, of dilating contracted bladders, or of applying certain agents to stimulate, modify, or soothe the mucous membrane. Double current catheters of silver or other metals are also used for washing out detritus after lithotripsy.

URETHRAL AND URO-CYSTIC.

DILATATION OF THE BLADDER.

"*Contracture of the bladder* with diminution of its capacity is a rare complication of cystitis in prostatic hypertrophy, but when this occurs measures must be promptly taken to *dilate the viscus* to its normal capacity, otherwise the life of the sufferer is rendered intolerable by the almost constant desire to urinate. A very excellent method by which this desired end may be obtained, is slow, gradual hydraulic dilatation. This is accomplished by injecting warm water to the point of tolerance, then, a few seconds after, by adding a very small quantity, perhaps not more than a drachm. The amount is slightly increased from day to day until, from half an ounce, which may have been the maximum quantity retained at first, in two or three weeks the capacity of the bladder is increased to eight, ten, or twelve ounces.

"*To render catheterism less painful* in cases of great irritability of the urethra and bladder, solutions of sundry substances are thereinto injected, or introduced into the rectum, such as morphia, atropia, hyoscyamus and more recently cocaine hydrochlorate. Harrison, of Liverpool, has suggested the use of some of these alkaloids, in small pessaries or suppositories, made of cacao butter, to be placed in the urethra or bladder by means of a specially constructed catheter (see Fig. 3047).—*Gaillard's Medical Journal*. John W. S. Gouley, M.D., Surgeon to Bellevue Hospital, &c. New York, July, 1885.

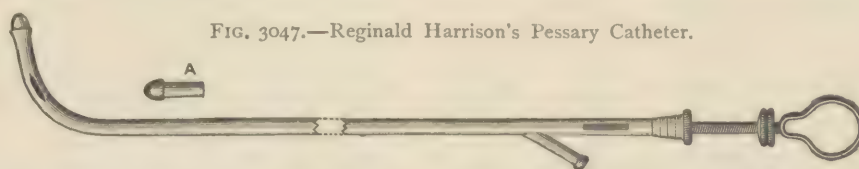


FIG. 3047.—Reginald Harrison's Pessary Catheter.

"A metallic catheter, open at the end, into which is received a cocoa-butter pessary (*a*) containing the requisite drug. After the urine has been allowed to run off, by pressing the stylet the pessary is projected into the bladder, when the instrument is removed. The treatment of many bladder affections is only to be effectually carried out by local measures, and, in addition to those we are already provided with, I believe this instrument will be of service. In this way I have frequently given a patient a good night by a morphia pessary, where rectum suppositories and other means have failed."—*Lancet*. Reginald Harrison, F. R. C. S., Surgeon to the Liverpool Royal Infirmary. Feb. 9, 1878.

PARACENTESIS VESICÆ, CYSTOTOMY.

Puncture of the Bladder.

"When the catheter, bougie or other means have failed to procure relief, the only thing that remains to be done is to puncture the bladder."—GROSS.

"In opening the bladder advantage is taken of the partial manner in which it is invested by the peritoneum to effect this object without detriment to its covering. Having regard to this object, the bladder may be opened as follows: 1. From the perinæum; 2. From the rectum; 3. Above the pubes; 4. By the subpubic operation of M. Voilemier; 5. Through the symphysis pubis."

Tapping the Bladder from the Perinæum.

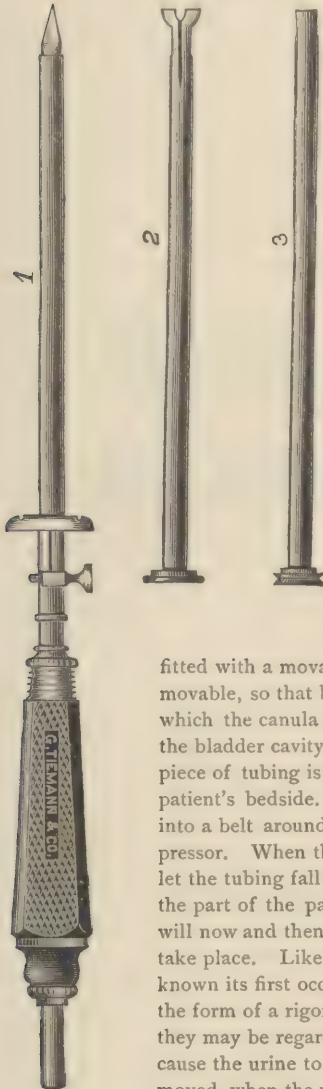
"Recognizing the necessity for establishing a permanent opening through which the urine could escape, I determined to tap the bladder from the perinæum. Taking the trocar (Fig. 3048) especially made for the purpose, I introduced it in the median line of the perinæum, three-quarters of an inch in front of the anus, and pushed it steadily through the prostate into the bladder, at the same time retaining my left forefinger in the rectum as a guide. On withdrawing the trocar a large quantity of ammoniacal urine escaped. The canula, being provided with a shield, was secured in place by tapes, much in the same way as a tracheotomy tube. A piece of india rubber tubing was attached to the portion of the canula which projected beyond the shield, and conveyed the urine into a vessel placed at the side of the bed. Through this tubing the urine continued to dribble. The patient was at once made comfortable by this arrangement, and in forty-eight hours he was up and sitting in an easy chair. To permit of this the rubber tubing was shortened during the daytime, its end being tucked through a light abdominal belt, where it was compressed by a small pair of bull-dog forceps, which were removed when the patient desired to pass water. For about six weeks my patient passed urine through the prostatic canula. Then it was noticed that urine in gradually increasing quantities began to flow through the natural passage, so much so as to lead me to infer that, for some reason or other, the prostate was ceasing to obstruct micturition. After removal of the canula, the puncture healed in the course of a few days, and with this the bladder gradually proceeded to recover its natural function and power."—Reginald Harrison, F. R. C. S., Lecturer on Clinical Surgery in the Victoria University, Surgeon to the Royal Infirmary, Liverpool. "International Cyclopædia of Surgery," Ashhurst. Vol. VI. 1886.

URETHRAL AND URO-CYSTIC.

PARACENTESIS VESICÆ, CYSTOTOMY.

Tapping the Bladder from the Perinæum.

FIG. 3048.—Harrison's Trocar.



"The operation of tunnelling the enlarged prostate from the perineum, which I introduced nearly five years ago, has been so favorably received in this country and in America, as a means of relieving the more urgent symptoms sometimes attending this complaint, as well as of permanently reducing the size of the gland, that I am induced to again draw attention to this treatment and to notice some modifications which tend to simplify the performance of the operation.

"The operation consists in puncturing the bladder with a special trocar and canula (made for this purpose for me by Messrs. Tiemann & Co., of New York), one inch in front of the anus. The trocar is made to pass through the large prostate at a lower level than that of the normal canal, the object being to make a 'low-level' urethra, and thus to favor a thorough drainage of the viscus. Where the bladder is largely distended with urine the process is simple enough; when this is not the case, and the operation is undertaken with another object, I advise the following procedure: The patient being placed in the lithotomy position under an anæsthetic, a catheter is passed and the bladder distended with tepid water; the beak of the catheter should then be reversed so as to lie in the dip above the large gland. A temporary ligature being placed around the penis and the escape of any fluid through the catheter being prevented, the trocar is then plunged from the perineum into the distended viscus; as the point of the trocar enters the bladder it will be found to strike against the end of the catheter, towards which it should be directed.

"The trocar is hollow, with an opening by the side of the point. Immediately the instrument penetrates the prostate, fluid escapes at the handle. The trocar is then withdrawn, and the canula is left behind. The latter is

fitted with a movable collar, perforated at the sides for fixing with a T bandage. The collar is movable, so that by means of a screw it can be nicely adapted to the thickness of the tissues through which the canula may have to pass, as it is undesirable to have too much of the tube projecting into the bladder cavity. The canula being thus adjusted and fixed with an ordinary perineal bandage, a piece of tubing is attached to the end of it, by means of which urine is conducted to a vessel by the patient's bedside. After a few days in bed the patient gets up, and then tucks the end of his tube into a belt around his waist. A pair of bull-dog forceps will be found to act as a convenient compressor. When the patient requires to pass water, all he has to do is to take off the compressor and let the tubing fall between his legs; urine then flows by gravity and without any expulsive effort on the part of the patient. After six, eight or ten weeks wear, according to circumstances, the patient will now and then be conscious that slight gushes of urine along the natural passage will involuntarily take place. Like as when urine passes along the urethra for the first time after lithotomy, I have known its first occurrence, after prostatic puncture, followed by slight indications of reflex action, in the form of a rigor, and some elevation of temperature. Where these involuntary gushes take place they may be regarded as indications that the gland has undergone such an amount of atrophy as to cause the urine to prefer the natural to the artificial channel for its exit. The canula can then be removed, when the wound speedily closes. One benefit the patient derives from catheterism being unnecessary, the easy way the bladder is washed out, the non-confinement to bed, and undisturbed repose, is obvious.

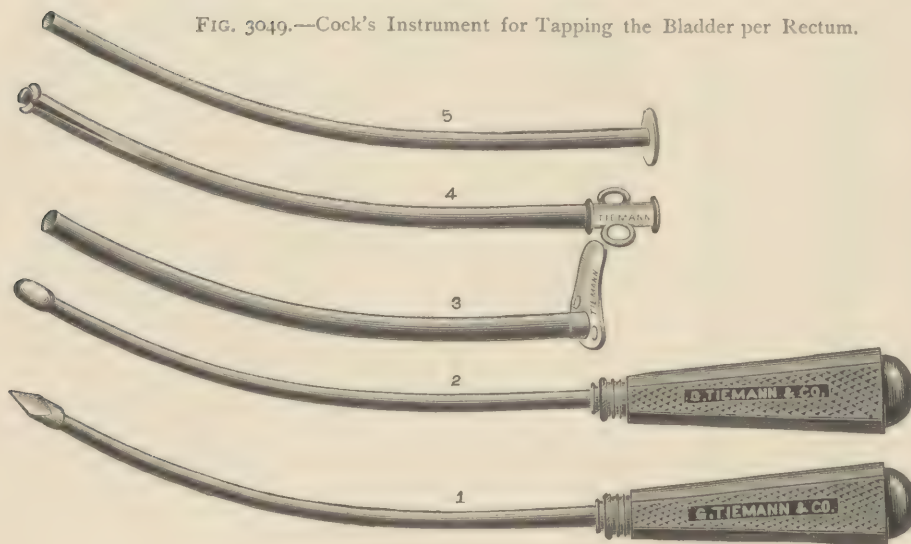
"After the repeated use of the aspirator both micturition and catheterism may again become permanently passive. this seems to point to some diminution of the gland having, in the interval, taken place. In conclusion, I would urge the adoption of tunnelling the prostate from the perineum as the best method of tapping the bladder in all cases of emergency where retention of urine from an enlarged prostate occurs and catheterism is found to be impossible; and, secondly, this operation may be undertaken with the view of inducing atrophy of the gland in cases where the functions of the bladder are so disturbed as to render life almost unbearable. In the observation of a considerable number of cases of difficult catheterism and large prostates, I have often thought that, in some instances, far less damage would have been done, and the patient's chances improved, had the practitioner, on recognizing his difficulty, used a trocar in a suitable position, rather than persevere with the catheter."—Reginald Harrison, F. R. C. S., Surgeon to the Liverpool Royal Infirmary and Lecturer on Clinical Surgery in the Victoria University. *Gaillard's Medical Journal*, March, 1886.

URETHRAL AND URO-CYSTIC.

PARACENTESIS VESICÆ, CYSTOTOMY.

Tapping the Bladder per Rectum.

FIG. 3049.—Cock's Instrument for Tapping the Bladder per Rectum.



"I consider, writes Cock, that the benefit of the operation consists, not merely in the immediate relief given to the patient, but also in the opportunity which it affords, by the retention of the canula in the bladder through an indefinite period, of diverting the flow of urine from its ordinary channel, and thus giving quiet, freedom from pain and the natural means of restoration to the maimed, irritable or diseased urethra. I conceive, also, that the bladder might be tapped with advantage in cases of obstinate stricture in which retention of urine does not actually exist.

"Cock's instruments consist of a canula (3) six and a half inches long, a blunt pilot trocar (2) and a sharp trocar (1); a second tube with an expanding end (4) to keep the canula in position; and a third (5) to maintain the second in position.

"*Operation.*—The patient should be placed and held in position for lithotomy and brought well to the edge of the bed. The operator must then introduce the index finger of the left hand into the rectum, with the palm upwards, to feel for the prostate, and, if possible, for the bulging base of the tense bladder beyond. Some little pressure above the pubes may help in this attempt. The pulpy point of the index finger is then to be held in the median line just below the spot at which the puncture is to be made. The surgeon then, with his right hand, is to take from his assistant the canula, well oiled and fitted with the *blunt* pilot trocar, and to introduce it into the rectum upon his left index finger, passing it well up to the point selected for the puncture. He should then steady the canula and hold it firmly in position with the thumb and three outer fingers of his left hand, and withdraw the blunt trocar. The *sharp* trocar can then be introduced through the canula, and, having reached its end, the handle with the canula is to be depressed and driven home, in a direction upwards and forwards, in a line towards the umbilicus. The bladder in this way will be entered, the free end of the instrument moving freely, and all resistance ceasing. The trocar should then be withdrawn and the canula pressed well home. Before the bladder is completely emptied it is well to insert the two inner canulæ, and fasten the whole in by means of tapes, two passed in front and two behind the thighs to a girth around the waist. The canulæ may then be plugged with a peg to retain the urine, or with a hollow plug inserted into a piece of india rubber tubing, through which the water may drain away.

"As soon as the urethral passage has become pervious to the catheter, but *not before*, the canulæ should be withdrawn; this condition taking place usually within a week from the introduction of the catheter. The stricture may then be treated on rational principles by dilatation. It is very remarkable how, at times, a stricture, which has thus been left alone and unirritated by catheterism or ineffectual natural efforts at micturition, gives way under such treatment, and a thoroughly impervious indurated urethra becomes pervious and amenable to simple measures.

"The wound into the bladder closes rapidly after the removal of the canula, even after many weeks; and in a case of my own no urinary fistula followed the presence of the canula for seven weeks. The surgeon then may perform this operation without fear in all cases of retention where any difficulty in catheterism exists. I know of no operation attended with equal good that is so safe, satisfactory or free from danger."—"Bryant's Practice of Surgery." Roberts. Am. Ed. 1881

URETHRAL AND URO-CYSTIC.

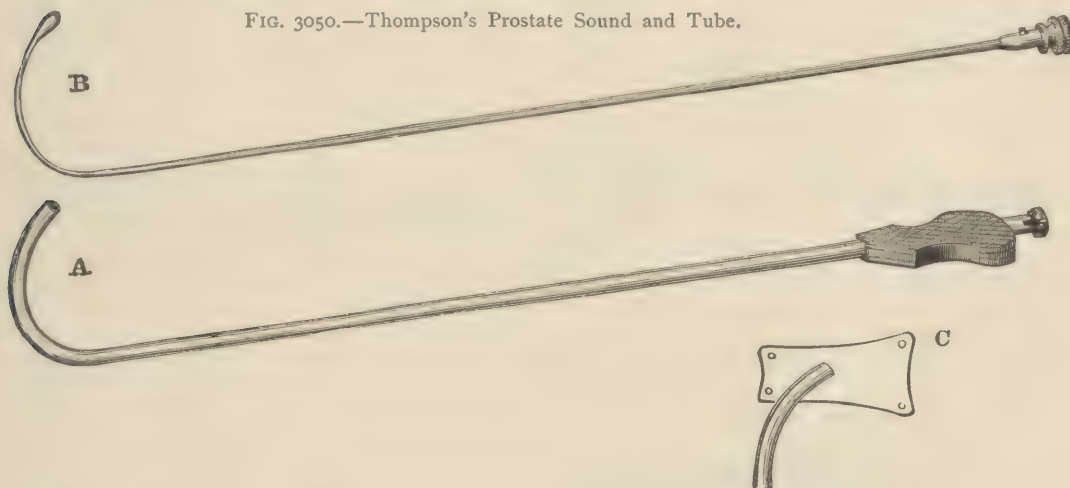
PARACENTESIS VESICÆ, CYSTOTOMY.

Tapping the Bladder above the Pubes.

Tapping the bladder above the pubis.—There is a space immediately above the pubic bone, where the anterior surface of the bladder may be reached with a trocar, or even the end of the finger, without wounding the peritoneum. Though this interval varies much in extent and is increased by the degree to which the bladder is distended, it is a condition of this operation, when undertaken from this point, that the puncture shall be made immediately above the pubis. Instances have occurred in which, this rule having been disregarded, the cavity of the peritoneum has been opened. The supra-pubic operation is probably the safest and most convenient one in cases in which it is tolerably obvious that it will only be required for temporary purposes until the bladder can be reached by the natural passage. For fulfilling such an object the aspirator (page 129, &c.) will be found a most useful instrument. Aspiration of the bladder above the pubis has now been so extensively practiced and with such good results, that no one would be at all likely to question its utility as a temporary expedient. If, in using the instrument, the finger be for a moment pressed firmly above the pubis, the passage of the needle is rendered almost painless. In this respect it strongly contrasts with the distress occasioned by attempts at catheterization, where the difficulty is increased by the tension thrown on the stricture by the largely distended bladder. The bladder may also be tapped in this situation with an ordinary trocar (a small incision being previously made with the knife), the canula being left in and retained by tapes, or an india rubber catheter introduced through the canula. For permanent wear, a shield of rubber or vulcanite may be attached, with a belt around the abdomen.

A modification of the supra-pubic puncture was some years since introduced by Sir Henry Thompson for treatment of certain advanced cases of prostatic disease, attended with much vesical irritability. Here the operator cuts down, immediately above the pubis, on the end of a sound (Fig. 3050) passed into the bladder by the urethra and by means of this introduces an elastic tube, which is then permanently fixed within the viscus. Provision is in this way made for reaching the bladder which might not present any prominence above the pubis, and when, consequently, tapping with the trocar and canula, as previously described, could not be undertaken with safety.

FIG. 3050.—Thompson's Prostate Sound and Tube.



A. Hollow sound, the end of which, when stopped with the stylet, B, forms the point which guides the operator in finding the bladder in the last incision. Size about 12 or 13 Eng.

B. Bulbous-ended flexible metal stylet.

C. Suprapubic tube of elastic gum, about $2\frac{1}{4}$ in. long, with silver plate, introduced in its whole length into the sound when the stylet is removed. The withdrawal of the sound leaves the tube in the bladder.

Subpubic operation of M. Voillemier.—This consists in plunging a trocar into the bladder through the anterior wall, entering it above the penis, after having drawn that organ downwards and backwards. The suspensory ligament is thus put upon the stretch and perforated, the instrument entering the viscus in the median line and beneath the arch of the pubis. This proceeding does not seem to have recommended itself to surgeons.

"Puncture through the symphysis pubis.—This was first proposed by Dr. Brander, of Jersey, in 1825, but although it has been successfully performed on several occasions, it is not a proceeding which has found general favor."—"International Cyclopædia of Surgery," Ashhurst. Vol. VI. 1886.

URETHRAL AND URO-CYSTIC.

DIGITAL EXPLORATION OF THE BLADDER IN OBSCURE VESICAL DISEASE.

Sir Henry Thompson's Method and Instruments.

"No one who has had much experience in the treatment of maladies affecting the urinary organs will deny that he occasionally meets with a case, the nature of which, however closely it is studied, is not determined by the ordinary methods of investigation. These methods comprise palpation and percussion externally, the use of the sound and catheter internally, and an examination of the characteristic secretion, the urine, physically, chemically and microscopically. Extensive as these resources are, a certain proportion of patients, larger, perhaps, than is generally supposed, receive treatment for long periods of time without any satisfactory diagnosis having been made of their cases.

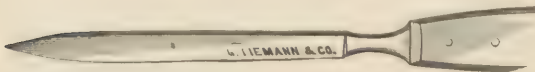
"Some five or six years ago I came to the conclusion that, keen and careful as we might be, the cases of urinary disease which defy analysis are so numerous and so important as to demand a further method of investigation than they had hitherto received; and I resolved to make a bold experiment for the purpose of accomplishing it. I determined on searching the bladder, if possible, with the *finger itself*, when the sound and other means had failed to inform me, and when the symptoms were so grave as to demand a knowledge of their source, and probably some efficient surgical action, in order to give a chance of life to the patient.

"The first question naturally arising was, Will it be possible to accomplish this completely in many, or, indeed, in a moderate proportion of these obscure cases? There proved to be no difficulty in the dead body; and, with anæsthesia, I thought there ought to be none in the living. And having well considered both the supra-pubic and the perineal routes, I adopted the latter, introducing my finger as far as to the internal meatus, by means of a *limited perineal urethrotomy*, without section of the prostatic urethra, finding that this afforded me an unexpected facility in obtaining that intimate knowledge of the interior of the bladder which I sought.

"It is the *object* and the *achievement* of the proceeding which are new, and not the incisions by which they are attained. Further, even the incision would not alone accomplish what is necessary, and could not do so until the discovery of anæsthetic agents enabled us to induce *complete relaxation of the abdominal muscles*, and thus to prosecute an enquiry not otherwise possible.

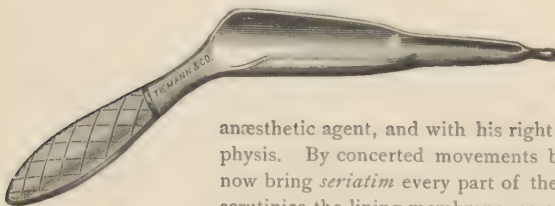
"I will now describe the method which my present experience has led me to adopt, and point out some of those details in prosecuting it which are the most important. The patient having been secured in the usual position for lithotomy and rendered insensible, a rather short median-grooved staff is carried into the bladder and held by an assistant. The knife to be employed should be straight, the blade very narrow and about two and three-fourth inches

FIG. 3051.—Thompson's Urethral Knife.



long. With this the operator makes a vertical incision of the skin in the line of the raphé, an inch and a quarter long, and terminating below about a half or three-quarters of an inch above the anus. Placing his left index finger, palmar surface upwards, in the rectum, so as to inform himself of the upper limit of the bowel, he introduces the knife with the cutting edge upwards, horizontally into the wound, until he reaches the groove of the staff, which should thus be struck about the junction of the membranous with the bulbous portion of the urethra. When contact is verified, the puncture of the canal is lengthened a little with the point of the knife, which is then withdrawn, incising in the act perhaps some of the tissues, so as to enlarge the wound towards the external orifice, but avoiding as far as possible injury to the bulb.

FIG. 3052.—Thompson's Vesical Director



A director, resembling a small gorget with blunt edges, is passed into the groove of the staff and serves as a guide to the left index finger, which is insinuated into the prostatic urethra and gently pressed onwards until the tip, slowly dilating it, enters the neck of the bladder. Arrived at this point, the operator should stand up, demanding the full effect at this movement of the

anæsthetic agent, and with his right hand press very firmly above and behind the pubic symphysis. By concerted movements between the left index finger and the right hand he may now bring *seriatim* every part of the interior of the bladder over the point of the index and scrutinize the lining membrane, so as to learn its physical condition to the minutest particular. If there is the smallest growth, recess or inequality of any kind, or even roughness, an adhering scale, or small calculus, it is recognized with ease and certainty. Occasionally, when the subject is very fat and the prostate large, considerable pressure is necessary to make the exploration complete, and now and then it may be impossible to reach the whole interior, as I have found in one case; but, if the relaxation of the abdominal walls is absolute, it is surprising how far the contents of the pelvis, with the aid of an assistant, may be, by continued forcible pressure, brought down towards the perinæum, and thus within reach of the operator's finger.

"If, in examination of the bladder, a growth is encountered, the surgeon should devote two or three minutes to

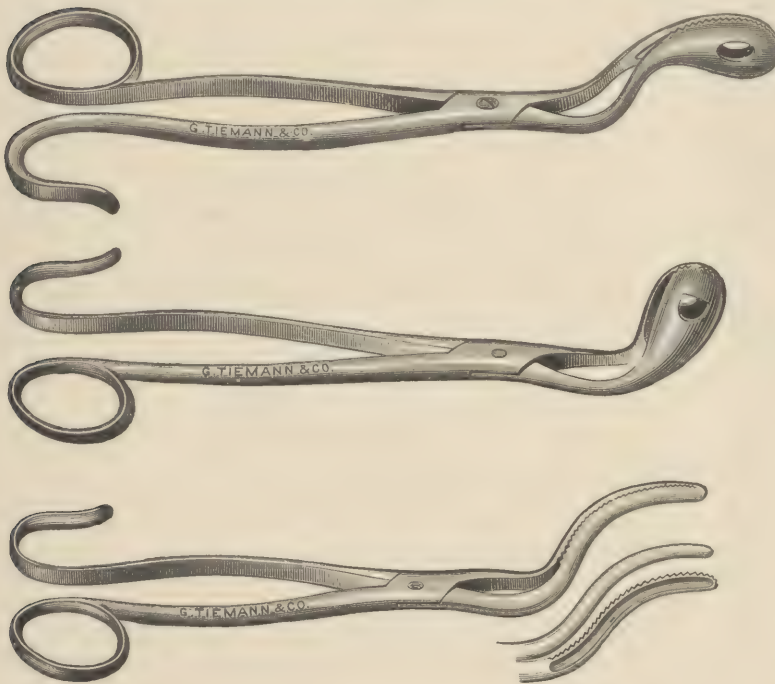
URETHRAL AND URO-CYSTIC.

DIGITAL EXPLORATION OF THE BLADDER IN OBSCURE VESICAL DISEASE.

Sir Henry Thompson's Method and Instruments. (Continued.)

deliberately estimating its exact size, form and density; its position in the bladder, and whether others are present also. He should do this again after he has resected himself, with and without supra-pubic pressure by his assistant, so as to be thoroughly acquainted with the situation of the growth. Then, withdrawing his finger, he introduces

FIGS. 3053, 3054, 3055.—Thompson's Vesical Forceps, for Removing Growths in Bladder. For Growths close to the Neck of the Bladder, with Separation of Blades to avoid Nipping Neck of Bladder.



slowly a pair of forceps, straight or curved according to his judgment, to the spot, holding lightly a handle in each hand, when he will almost certainly seize the growth if he be careful and deliberate in his movements; much in the same way as he would in seeking a nasal polypus. Having assured himself that he has a fair hold, he is not to drag or tear out the body, or even much twist the forceps, especially if the material is tense, or he may injure the bladder itself. I find it better to "jamb" or "mash" together the rough margins of the forceps before I endeavor to withdraw and effect separation thus if I can. If this is not easily accomplished, I introduce the left index and complete the operation with the finger nail if possible, which is sometimes a very efficient instrument. Proceeding thus, partly by forceps, of which I have employed various forms (see Figs. 3053, 3054, 3055), partly by the finger, the removal of the mass may be safe-

ly accomplished, entirely so if the growth or growths be simple and pedunculated; less completely when the base is wider, employing the forceps several times, carefully removing as much as possible, piece by piece; and but very imperfectly if the tumor is mammilated and not at all pyriform in character. In the female I have sometimes slowly brought it within view and have put on a ligature. A small ecraseur, threaded with wire, may be useful in some cases.

"There is one source of danger which I would point out and which must be carefully guarded against. It may happen during the operation that the assistant is required to press very firmly above the pubes, so as to bring the growth nearer to the operator. By doing so at this stage, it is quite possible that the upper part of the bladder may be inverted and pushed downwards in a fold, presenting itself toward the operator as an eminence and be mistaken for a large polypus or growth, an error which might be fatal. The possibility of the occurrence should not be lost sight of; hence my admonition to examine the bladder, not only with, but without the influence of pressure, and so as to ascertain precisely what is to be removed before any attempt to do so is commenced. After the removal, whatever the result may be, a stout India rubber tube, about five or six inches long and the diameter of a little finger, is secured in the wound to wash out the debris and to serve as a channel from the bladder to some vessel placed for the purpose. Hæmorrhage is usually free for a few hours and gradually subsides. If the tube causes irritation it may be removed soon; if not, it may remain a day or two."

After stating experience Sir Henry Thompson closes the article as follows:

"And I trust my brethren will agree with me, that the proceeding described will enable us to prolong life in many cases, and to avert disease completely in some, where, without such aid, it must inevitably prove fatal."—*Medical News*, January 5, 1884.

URETHRAL AND URO-CYSTIC.

OPERATING CASES.

Van Buren and Keyes' Compact Set of Urethral Instruments.

\$76.21.

- 1 Grooved Staff.
- 3 Whalebone Guides, one long and two short.
- 4 Tunneled Sounds.
- 1 Thompson's Probe-pointed Catheter, modified by Otis.
- 1 Silver Catheter, No. 12, short curve.
- 1 Thompson's Tunnelled Divulsor.
- 1 Civiale's Bistoury Caché.
- 1 Civiale's or Maisonneuve's Urethrotome.
- 1 Gouley's Catheter Staff.
- 1 Silver Probe.
- 1 Small Scalpel.
- 1 Silver Director-Probe.
- 1 Curved Trocar.
- 1 Double Silver Tube.
- 1 Morocco Case, with extra spaces, lined with oil-dyed cotton velvet.

Gouley's Complete Stricture Set (superior finish.)

\$109.

- 6 Steel Sounds, conical.
- 1 Gouley's Divulsor, nickel-plated.
- 1 Gouley's Retention Catheter.
- 1 Gouley's Catheter Staff.
- 6 Gouley's Tunnelled Sounds.
- 1 Gouley's Meatotome.
- 1 Director Probe, silver
- 1 Beaked Bistoury.
- 5 English Bougies à Boule.
- 12 English olive-pointed Bougies.
- 6 English Gum Catheters.
- 6 Whalebone Guides.
- 2 English Tunnelled Catheters.
- 1 Metrical Sound Gauge, German silver.
- 1 Gouley's Dilating Urethrotome, two points.
- 1 English and French Rule.
- 1 Rosewood Case, lined with silk velvet.

Gouley's Compact Stricture Set.

\$50.

- 4 Conical Steel sounds, nickel-plated.
- 3 Gouley's Tunnelled Sounds.
- 1 Gouley's Retention Catheter.
- 1 Gouley's Dilating Urethrotome, two points.
- 1 Gouley's Meatotome.
- 1 Gouley's Catheter Staff.
- 1 Beaked Bistoury.
- 1 Grooved Director Probe, silver.
- 1 Mahogany Case, with extra spaces, lined with oil-dyed cotton velvet.

Van Buren and Keyes' Set of Urethral Instruments.

\$121.55.

- 1 American Gauge.
- 12 Conical Steel Sounds, nickel-plated, 2d.
- 3 Whalebone Guides, one long and two short.
- 1 Otis' Catheter.
- 1 Silver-plated Catheter, No. 12.
- 2 Silver-plated Prostatic Catheters.
- 1 Thompson's Tunnelled Divulsor.
- 1 Civiale's Bistoury Caché.
- 1 Civiale's Urethrotome.
- 1 Gouley's Catheter Staff.
- 1 pair of Urethral Forceps.
- 1 Cupped Sound, No. 12, nickel-plated.
- 4 English G. E. Catheters.
- 12 French G. E. Conical Bougies.
- 6 French G. E. Olivary Catheters.
- 4 Mercier's Elbowed Catheters.
- 17 Bougies à Boulé.
- 1 Mahogany Case, lined with oil-dyed cotton velvet.

Skene's Uro-Cystic and Urethral Set.

\$63.35.

- 2 Skene's Urethral Specula.
- 1 Folsom's Speculum (modification).
- 1 Skene's Reflux Catheter for Bladder.
- 1 Skene's Reflux Catheter for Urethra.
- 2 Silver Probes.
- 1 Sponge Holder, steel wire.
- 1 Knife, wire.
- 1 Blake's Polypus Snare (Ear).
- 1 Allen's Polypus Forceps (Ear).
- 2 Glass Pipettes, six inches long.
- 2 Head Mirrors, on same strap, 3½ and 1½ inches.
- 1 Lente's Caustic Cup.
- 2 Skene's Self-retaining Catheters.
- 2 Rectal Endoscopes, long and short, with fenestrated Rubber Specula.
- 3 Urethral Endoscopes (Nos. 13, 15, 17, American), with Bevelled Rubber Specula.
- 2 Bevelled Urethral Endoscopes (Nos. 19, 21, American), with Fenestrated Rubber Specula.
- 1 Brush, for cleaning Endoscopes.
- 1 Rosewood or Mahogany Case, lined with oil-dyed velvet.

Set of Silver Catheters.

\$25.

- 12 Silver Catheters.
- 1 Bottle for Oil.
- 1 Gauge.
- 1 Mahogany Case, lined with fine velvet.

. Special selections of instruments cased to order.

URETHRAL AND URO-CYSTIC.

OPERATING CASES.

U. S. A. Genito-Urethral Set, No. 1.

\$75.

- 1 Gouley's Dilating Urethrotome, with two points.
- 1 Gouley's Tenaculum.
- 1 Gouley's Beaked Knife.
- 1 Gouley's Silver Director.
- 3 Gouley's Tunnelled Sounds.
- 1 Double Current Catheter, silver.
- 1 Gouley's Grooved and Tunnelled Catheter Staff.
- 1 Gouley's Tunnelled Catheter.
- 6 Otis' Bougies à Boule.
- 1 Thompson's Urethral Forceps.
- 1 set (4) Sounds, fitting one handle
- 12 Gouley's Whalebone Guides.
- 1 Mercier's Gum Catheter.
- 1 Steel Gauge, French and American.
- 2 Pasteboard Gauges, French and American.
- 1 Otis' Whalebone Guide.
- 4 Velvet-eye Catheters (Tiemann & Co.'s patent).
- 6 Olive-pointed Bougies, English.
- 1 Crin de Florence.
- 1 Thompson's Dilator, modified by Gouley.
- 1 Rubber Yoke (Catheter Holder).
- 1 Rosewood Case, lined with French rouge skin (chamois).

U. S. A. Genito-Urethral Set, No. 2.

\$140.

- 21 Otis' Short-beaked Steel Sounds, Nos. 20 to 40, inclusive.
- 33 Otis' Bougies à Boule, metal, nickel plated, Nos. 8 to 40, inclusive.
- 1 Otis' Dilating Urethrotome, straight.
- 1 Maisonneuve's Urethrotome: No. 8 Otis' Gauge, with two blades, 1 Tunnelled Tip for Whalebone Guides and 2 Tips with Filliform Bougies.
- 2 Otis' Whalebone Guides.
- 1 Otis' Urethrameter.
- 12 Rubber Cones for Urethrameter.
- 3 Otis' Endoscopes, hard rubber, Nos. 22, 26, 32.
- 1 Otis' Meatus Bistoury.
- 1 Otis' Steel Gauge.
- 1 Mahogany Case, lined with French rouge skin (chamois) and secured with two bolts and lock.

Lithotomy Set.

\$47.

- 1 Liston's Bistoury.
- 2 Steel Sounds.
- 3 Lithotomy Staffs.
- 2 Lithotomy Forceps, medium and small.
- 1 Double Current Catheter, silver.
- 1 Hard Rubber Syringe, with a Stopcock to fit the Catheter
- 1 Mahogany or Rosewood Case.
- 1 Scoop and Conductor.
- 1 Blizard's Bistoury.
- 1 Lithotomy Scalpel.

Van Buren and Keyes' Set of Instruments for Stone.

\$134.75.

- 1 Thompson's Searcher.
- 1 Thompson's Lithotrite, heavy.
- 1 Thompson's Lithotrite, light.
- 1 Evacuating Catheter, Nott's.
- 1 pair Urethral Forceps, Thompson's.
- 2 Lithotomy Staffs, lateral.
- 1 Median Lithotomy Staff.
- 1 Lithotomy Scalpel.
- 1 Lithotomy Bistoury, straight, sharp-pointed.
- 1 Blizard's Knife.
- 1 Blunt Gorget.
- 1 Little's Director.
- 1 Scoop.
- 1 pair of Lithotomy Forceps, with crossed handles.
- 1 pair of Lithotomy Forceps, with curved blades.
- 1 pair of Crushing Forceps.
- 1 Tube, with globular head, for Washing the Bladder.
- 1 Shirted Canula (à chemise).
- 1 Keith's Tenaculum.
- 1 Mahogany or Rosewood Case, lined with oil-dyed velvet.

Little's Median Lithotomy Set.

\$54.

- 4 Little's Staffs, Nos. 7, 9, 10, 12.
- 1 Straight Sharp-pointed Bistoury.
- 1 Little's Director.
- 1 pair Dressing Forceps.
- 2 pairs Lithotomy Forceps.
- 1 Thompson's Searcher.
- 1 Small Sound, for children.
- 1 Canula (à chemise).
- 1 Hard Rubber Syringe, No. 5, Nozzle to fit Catheters.
- 1 Dolbeau's Stone Crusher.
- 1 Lithotomy Scoop, ebony handle.
- 1 Mahogany Case, lined with oil-dyed velvet.

May's Lithotomy Set.

\$39.

- 1 pair of Lithotomy Forceps, large.
- 1 pair of Lithotomy Forceps, medium.
- 1 pair of Lithotomy Forceps, small.
- 3 Plain Steel Sounds.
- 2 Lithotomy Staffs.
- 1 Canula (à chemise).
- 2 English G. E. Catheters.
- 1 Sharp-pointed Lithotomy Scalpel.
- 1 Probe-pointed Lithotomy Scalpel.
- 1 Probe-pointed Lithotomy Bistoury.
- 1 Hard Rubber Syringe, No. 5, the nozzle to fit the Catheter.
- 1 Mahogany Case, lined with oil-dyed velvet.

URETHRAL AND URO-CYSTIC.

FOREIGN BODIES.

Extractors.

FIG. 3056.—Reliquet's Urethral Stone Crusher.

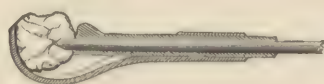
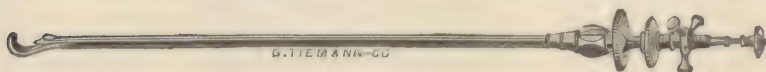
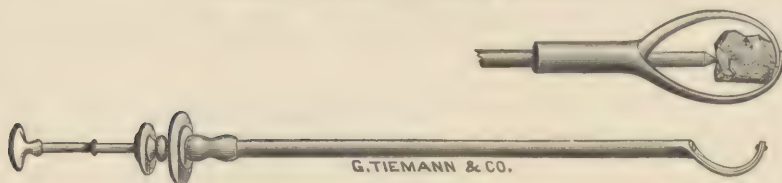


FIG. 3057.—Nelaton's Urethral Foreign Body Instruments.



FIG. 3058.—Mathieu's Urethral Lithotrite.



"Besides the foreign bodies which find their way into the bladder through wounds, or come down the ureters (renal calculi), a host of substances have been encountered in the bladder, introduced through the urethra. All imaginable articles, such as pins, beads, stones, pieces of straw, heads of rye, heads of wheat, portions of glass, tubing, pipe stems, lead and slate pencils, portions of chalk, wax, &c., have been found in the male bladder, introduced there through the urethra under the influence of morbid erotic fancies. The patient's shame will often prevent him from seeking relief; a small smooth foreign body in a healthy bladder may create no disturbance at first, and so the patient goes on, supposing that everything has arranged itself, until, in after years, he gets bladder symptoms, is cut for stone and the latter is found to have formed upon a nucleus introduced

from without. Not unfrequently, however, a foreign body comes legitimately, as it were, into the bladder; dermoid cysts, containing bones, teeth and hair, may discharge into the cavity; the broken end of a metallic, or more commonly a gum elastic catheter, may constitute the foreign body. A catheter is most apt to break at the eye. The old-fashioned gutta serena instrument is particularly dangerous, on account of its liability to become brittle when old. Again, substances of all sorts, bone, seeds, &c., may enter the bladder through ulceration into the rectum, while splinters, bullets and bone may be lodged there during injuries of the bladder.

"When the nature of the substance in the bladder has been learned, an attempt should be made to extract it, to prevent it from becoming a nucleus for stone. Anything which will go into the urethra would come out of it if it could be correctly seized, with its point turned backward, and be drawn upon in a correct line. Consequently an attempt should be made to reach all long bodies, and all small bodies, by using a *small lithotrite*, or other *forceps* designed for this special purpose, of which there are several varieties (see page 399). If the object be seized in a faulty diameter, it may be released and caught again. This rule applies to portions of metallic catheters as well. It is exceedingly difficult to catch them correctly; soft catheters, however, are very easy to extract; they should be doubled up, and may be withdrawn, however caught. Care must be exercised, of course, not to catch a fold of the bladder.

"For all foreign bodies of wax or glass, and for all such as cannot be extracted after patient gentle effort with the lithotrite or forceps, the median operation for stone should be performed, and this as early as possible, before the foreign body has had time to become incrustated with urinary salts. If, for any reason, it should be advisable to postpone the operation, it would be wise to wash out the bladder daily, with a view of retarding calculous deposit upon the nucleus. Dr. Douglas, of Rondout, N. Y., in cutting a patient to extract a piece of glass, fearing that pressure with his forceps might splinter it in the bladder during extraction, devised the ingenious expedient of covering the blades of his forceps with soft molasses candy, knowing that, if any of this substance was left in the bladder, it would melt and pass away. The device was fully successful."—"Genito-Urinary Diseases with Syphilis." Van Buren and Keyes. 1874.

Mercier's duplicator (Fig. 3063) resembles a lithotrite in general shape; it differs from it only in the arrangement of the blades. The female blade is pierced and its edges are very prominent; the male scoop, which is hook-shaped at the lower concavity, terminates at the angle of junction with the shank of the instrument in a rounded projection. If a *soft*

URETHRAL AND URO-CYSTIC.

FOREIGN BODIES.

Extraction. (Continued.)

and *flexible foreign body* like a catheter is seized between the two blades, and the male blade is pushed on until it meets the other, the foreign body, being pushed back by the "pigeon's beak" of the male blade, slides along as far as the hook, where it is fixed against the female blade. The instrument is withdrawn at the same time and the foreign body is bent. The fenestra of the female blade is intended to permit the convex portion of the male blade to become engaged in it. Experience has shown that Mercier's instrument is very useful in practice, and that it is preferable to others in cases of catheters. Collins' foreign body instrument (Fig. 3064) is of the shape of an ordinary lithotrite. At the side of the handle is a thumb-screw for fixing the blade at will. The female blade is rather large, presenting on one side a projecting ridge, very high at the elbow and diminishing more and more up to the end of the blade, where it no longer projects. The border of the other side of the female blade is much lower than the opposite, but has a sudden projection at the tip. The male blade is narrower than the female and of a rounded, triangular form, presenting the apex to the scoop of the female blade. As the two blades are approached, the foreign body, if grasped transversely, slides toward the end of the scoop, where, coming in contact with the projection, it is revolved in a plane, and thus places itself in the axis of the instrument, where it is firmly held by the union of the two blades. Upon withdrawing the instrument, we must assure ourselves that it is well in the axis. If this is not so it has been seized too far from the end, and must be brought nearer.

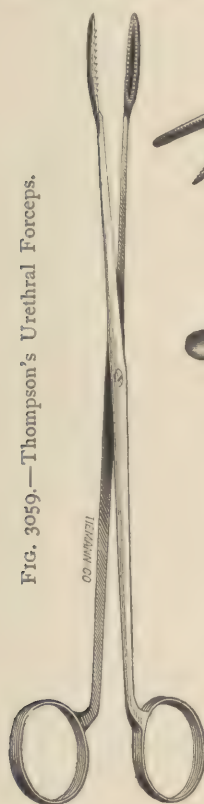


Fig. 3059.—Thompson's Urethral Forceps.

G. TIEMANN & CO.

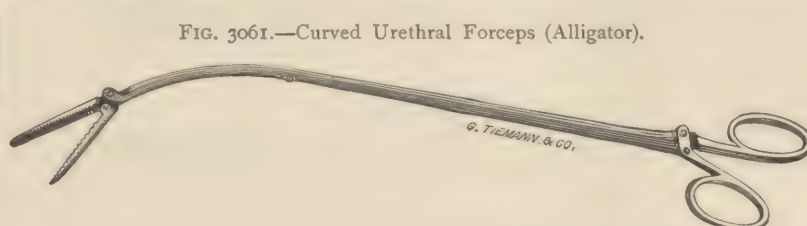


FIG. 3061.—Curved Urethral Forceps (Alligator).

G. TIEMANN & CO.

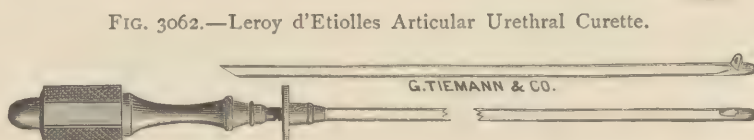


FIG. 3062.—Leroy d'Etiolles Articular Urethral Curette.

G. TIEMANN & CO.

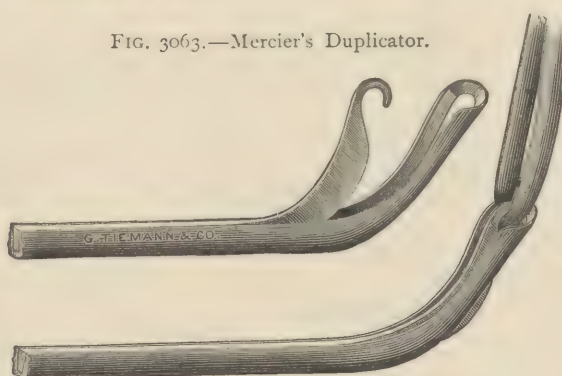


FIG. 3063.—Mercier's Duplicator.

G. TIEMANN & CO.

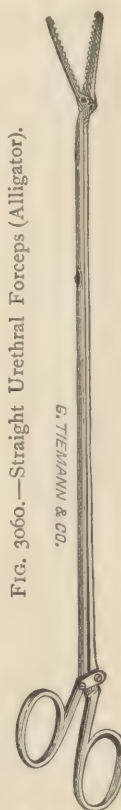


FIG. 3060.—Straight Urethral Forceps (Alligator).

G. TIEMANN & CO.

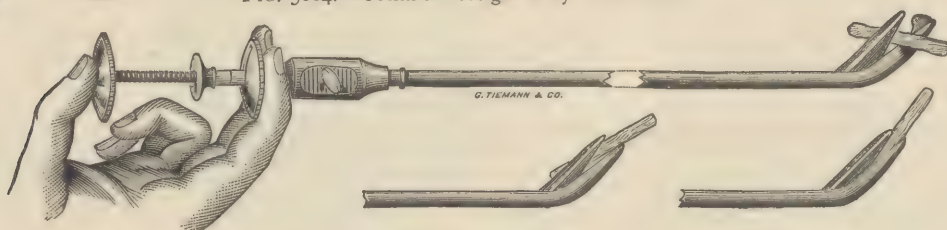


FIG. 3064.—Collin's Foreign Body Instrument.

G. TIEMANN & CO.

CYSTO-LITHIC.

STONE, LITHIASIS CYSTICA, VESICAL OR URINARY CALCULUS.

Stone Searchers, Sounds, Lithophone.

Stone, the common name of calculus in the urinary bladder, is formed by a precipitation of the urinary salts either in the kidney, passing thence to the bladder, or primarily in the bladder. In the latter case a foreign body may be the nucleus. The prominent symptoms are irritability of the bladder with frequent irresistible desire to pass water, and occasional stoppage of the stream, with pain in various parts of the urinary system and sometimes the presence of blood, mucus and pus in the urine. None of these, however, can be depended on, the only sure diagnosis resting on making the stone perceptible to the ear and fingers by means of a *metallic sound* introduced through the urethra and brought into direct contact with the foreign body.

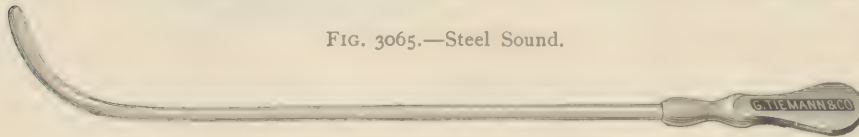


FIG. 3065.—Steel Sound.

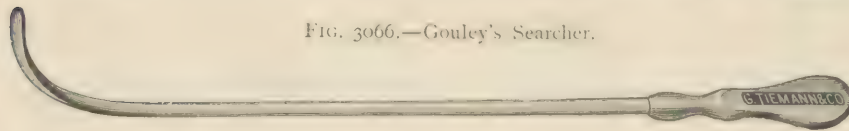


FIG. 3066.—Gouley's Searcher.

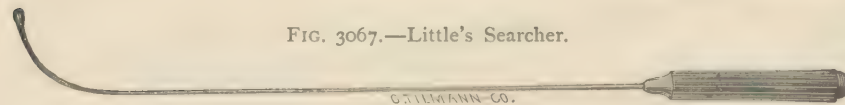


FIG. 3067.—Little's Searcher.

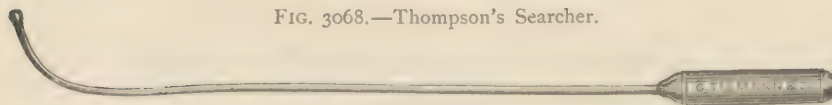


FIG. 3068.—Thompson's Searcher.



FIG. 3069.—Otis' Exploring Sound (is also used for exploring strictures).

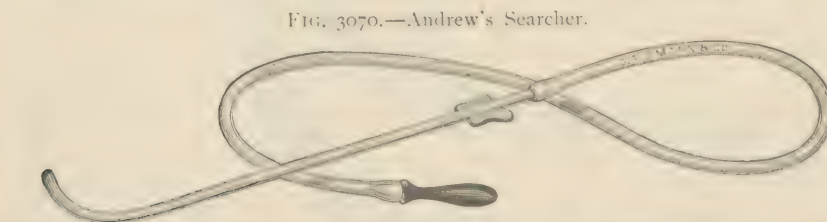
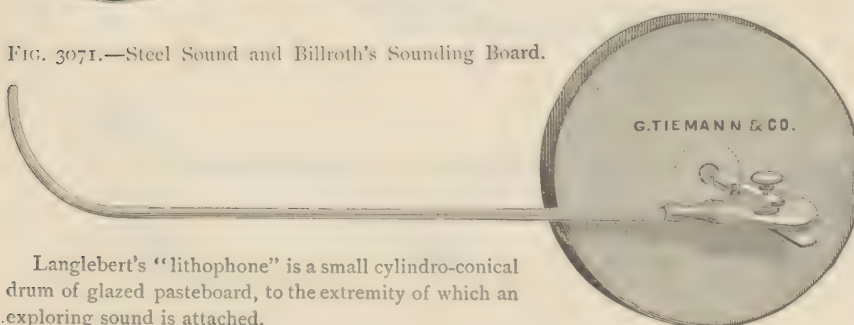


FIG. 3070.—Andrew's Searcher.

FIG. 3071.—Steel Sound and Billroth's Sounding Board.



Langlebert's "lithophone" is a small cylindro-conical drum of glazed pasteboard, to the extremity of which an exploring sound is attached.

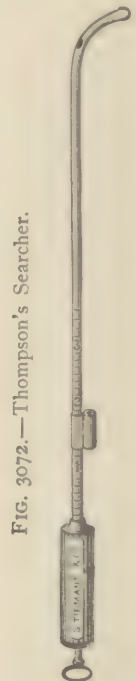


FIG. 3072.—Thompson's Searcher.

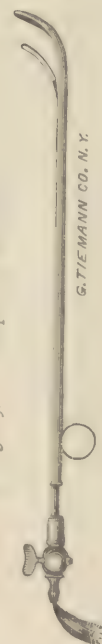


FIG. 3073.—Thompson's Measure.

CYSTO-LITHIC.

METHODS OF REMOVAL OF STONE FROM THE BLADDER.

1. Solution; 2. Extraction as a whole through the Urethra; 3. Lithotrity; 4. Lithotomy.

"1. *Solution* has been attempted by remedies taken by the mouth, or injected into the bladder. Uric acid calculi have been treated by the administration of alkalis and the phosphatic by the injection of a solution of nitric acid. These methods have, from their inefficiency, fallen into disuse.

"2. *Extraction by the urethra* is done in females; in them the canal is so short and dilatable that a stone of considerable size can be removed by this method.

"3. *Lithotrity*.—Crushing into fragments of such size that they can pass through the urethra is indicated, in patients beyond puberty, when the stone is single and not large, and when the urethra is not strictured and the bladder and kidneys are not much diseased. The early instruments used for this purpose were very rude and dangerous, the stone being grasped by branches made to protrude from a straight catheter and then bored by a drill extending through the instrument and worked by a watchmaker's bow; after it was bored it was crushed by another complicated instrument. To Civiale (1817-24) is unquestionably due the credit of having introduced the operation by improving the instruments and the manner of their use. The instruments *now* used are composed of two sliding blades, introduced in the shape and after the manner of a sound, between which the stone is seized and then crushed by the gradual pressure of a screw; the fragments may then be washed out by injections or by the urine, large pieces being again broken by the same or another instrument.

"4. *Lithotomy*.—Extraction through an opening artificially made into the bladder is indicated in all males under puberty, and in others when the stone is large or there are several; when the urethra is strictured; when the bladder is in such a condition as to be unable to bear the repeated introduction of lithotrity instruments and the irritation caused by the fragments resulting from lithotrity. Lithotomy was practiced twenty-five centuries ago; Hippocrates bound his pupils by oath not to practice it, but it came into use again in the time of Celsus, in whose writings are found the first indications of the bilateral operation; the lateral operation was first practiced toward the end of the seventeenth century; the supra pubic method was first employed by Franco in the sixteenth century and the recto-vesical by Sanson in the nineteenth."—"American Cyclopædia."

"*Perineal lithotrity*.—The combination of external urethrotomy in the membranous region, dilatation of the prostate and neck of the bladder, with fragmentation of the stone and immediate removal of debris, proposed and performed by Dolbeau in 1862, as an additional resource of surgery, to rid patients of stone with a minimum amount of cutting."—GOULEY.

LITHOTRITY, LITHOTRITES.

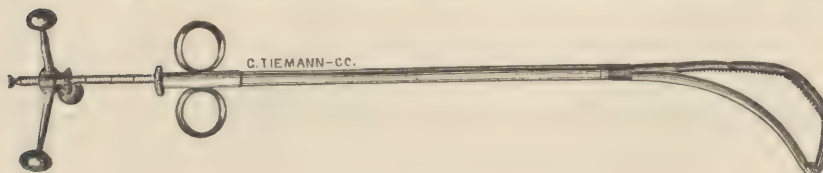
Lithotrity.—The operation of breaking or crushing vesical calculi into fragments of such size that they may be passed with the urine through the urethra. The instruments employed for this purpose are called lithotrites, lithotritors, lithotriptors, lithoclasts.

"The *lithotrite* is the perfected result of many trials and of the correction of faults, as found out by experience, in instruments previously invented, modified and thrown aside. Amusat and Key had established the fact that straight instruments could be passed through the urethra into the bladder with a certain degree of facility, and for this reason, apparently, the earlier efforts to bring a perforating, grinding or triturating power to bear upon the stone were made by Civiale and his followers with straight instruments. This surgeon made his first great success with his 'litholabe'—a straight instrument—and for ten years no other than straight instruments were used for lithotrity."

FIG. 3074.—Jacobson's Lithotrite, closed for Introduction.



FIG. 3075.—Jacobson's Lithotrite, open, for Seizure of the Stone.

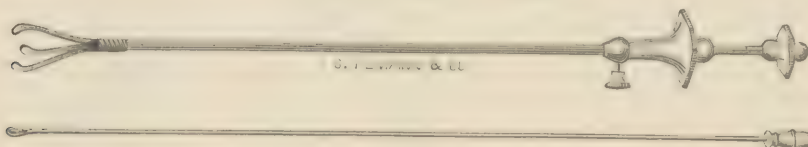


CYSTO-LITHIC.

LITHOTRITES.

For Breaking or Crushing Vesical Calculi into Fragments of such size that they may be passed through the Urethra.

FIG. 3076.—Hunter's Trilabe.



"Hunter's trilabe is still occasionally employed to catch lost fragments and in case of impaction of a fragment in the urethra. About the year 1834 the articulated lithotrite of Jacobson and the curved lithotrite with jaws to open and shut, devised by Weiss, of London, began to be substituted for the 'trilabe,' and Heurteloup so modified this latter invention that percussion, by means of a hammer applied to the extremity of the male blade, causes fragmentation of the stone. This instrument has been gradually superseded by the varieties in use at the present time, *i. e.*, those worked either by *lever power*, with rack and pinion, or screw. Sir Wm. Fergusson's instrument is worked by rack and pinion. Its crushing power is regulated by the strength of the operator's hand, and may be increased by exercising a certain jerking impulse, resembling that of the percussion hammer, or by using the hammer itself."—"Genito-Urinary Diseases with Syphilis." Van Buren and Keyes.

FIG. 3077.—Lever Lithotrite.

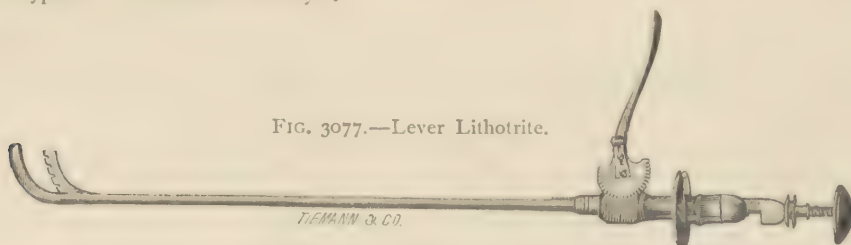


FIG. 3078.—Fergusson's Lithotrite.

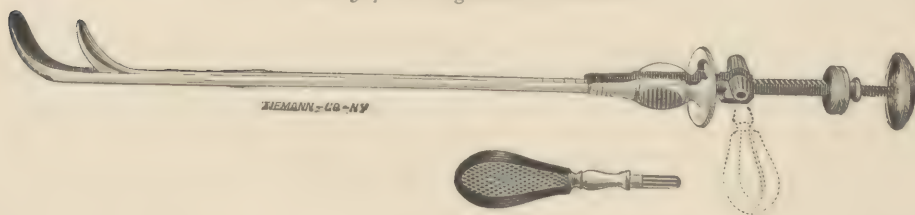
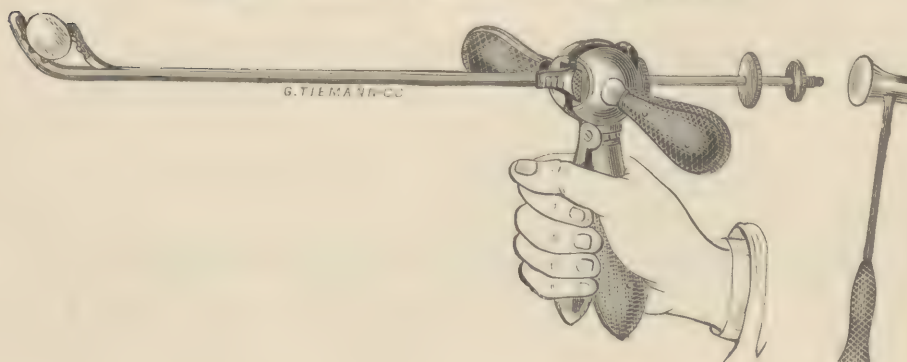


FIG. 3079.—Heurteloup's Lithotrite and Mallet (Percuteur)



CYSTO-LITHIC.

LITHOTRITES.

For Breaking or Crushing Vesical Calculi into Fragments of such size that they may be passed through the Urethra.

FIG. 3080.—Handle of Thompson's Lithotrite.

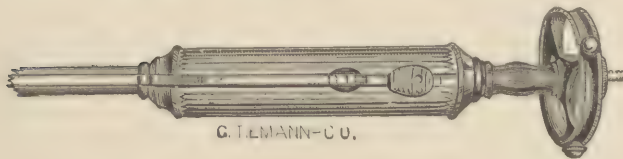


FIG. 3081.—Thompson's Lithotrite.



FIG. 3082.—Handle of Teevan's Lithotripter.

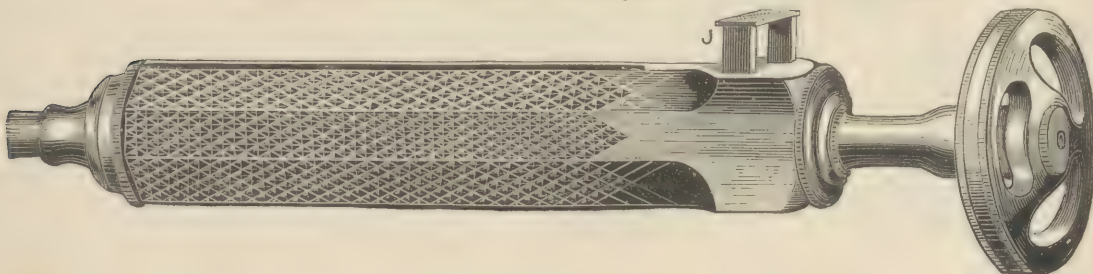


FIG. 3083.—Civiale's Lithotripter.



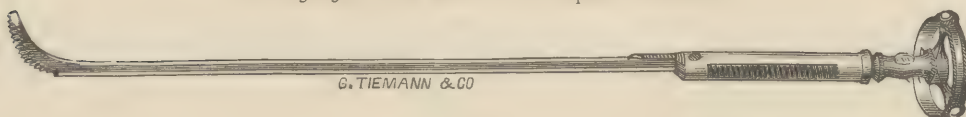
In Civiale's lithotripter the screw-power is thrown in and out of gear by a quarter turn of a movable disk attached to the handle of the female blade (Fig. 3083).

Considering a lithotrite as composed of parts, we speak of the *female blade* and the *male blade*. The *female blade* is the one continuous and fixed to the handle (Fig. 3084), it is deeply grooved for the reception of the *male blade* or sliding rod (Fig. 3085).

FIG. 3084.—Female Blade of Thompson's Lithotrite.



FIG. 3085.—Male Blade of Thompson's Lithotrite.



The greater efficiency of the *screw* as a power, and the ease and smoothness with which it acts, have led to its very general adoption for lithotrites. Civiale's (Fig. 3083), Thompson's (Fig. 3080) and Teevan's (Fig. 3082) instruments are worked in this way. The motive power of these instruments resides in the handles and may be applied or detached at will, so that the male blade can be withdrawn to the required extent and then brought into connection with the screw, by simply sliding the button on the handle of Thompson's instrument (Fig. 3080), or by moving the vertical slide *J*, on the handle of Teevan's (Fig. 3082).

CYSTO-LITHIC.

LITHOTRITES.

For Breaking or Crushing Vesical Calculi into Fragments of such size that they may be passed through the Urethra.

When the male blade is pushed home as far as it will go, we say the lithotrite is closed—and then call the curved extremity *the beak*, the other, by which we take hold of the instrument, the handle and the part between handle and beak *the shaft*. When the male blade is drawn out, the beak separates, or opens, and we now speak of the halves as *jaws* (Figs. 3086, 3087).

FIG. 3086.—Fenestrated Jaws of Lithotrite.

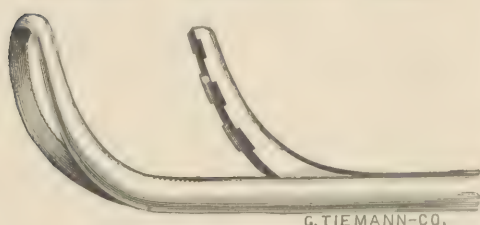
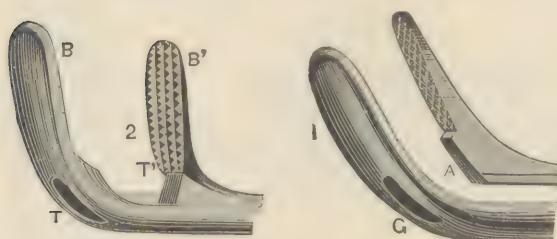


FIG. 3087.—Closed Jaws of Lithotrite.



The jaws of lithotriptors vary in strength and structure, in accordance with the work required of them. For reducing stones, of large size and considerable hardness, to fragments, the male blade is narrow, with deep and sharp angular teeth, while the female blade is broad, heavy and fenestrated (Fig. 3086). In closing the jaws, fragments and detritus are forced through this fenestrum, so that no clogging or impaction can take place.

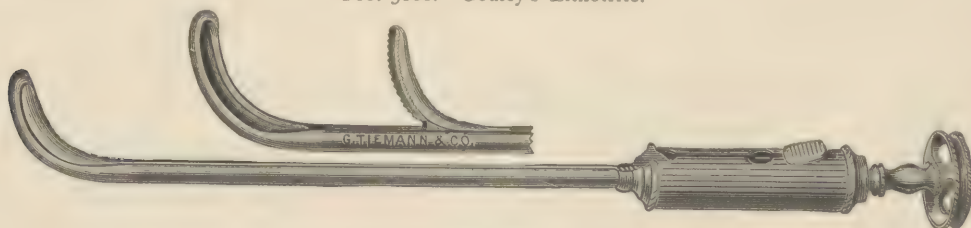
For crushing small or soft calculi, or for pulverizing fragments, the jaws of the lithotriptor are shorter, less heavy and their opposing surfaces are simply roughened, so that detritus produced may pass off with the urine.

Mercier has made valuable improvements in the jaws of lithotriptors, in Fig. 3087 will be observed a slit at the base of the female blade, *T*, through which accumulated detritus is ejected by means of a plough-share or spur, *T*, which, at the same time, adds enormously to the strength of the instrument. This spur fits into the eye of the female blade, so that, if the finger be passed over the hole when the blades are closed, no inequality will be felt. The spur is also made as seen in Fig. 1A, which may be regarded as a model instrument. It is not easy to exaggerate the value of the spur, *T*, for it enables us to use a very slender instrument in cases where it would

otherwise not have been safe, and thus extends lithotripsy to a field from whence it was previously excluded, for there are many patients whose urinary tract is in such a state of irritation that repeated manipulations with heavy lithotrites could not be borne.

Our lithotrites are *forged* out of the best English steel. The groove in the female blade is cut with a machine made for this special purpose. When finished, they are *tested*, by breaking with them pieces of soft grindstones. We should advise surgeons to test their instruments in this manner, before attempting to use them in the bladder; it will exercise their tact and judgment. When a stone is between the jaws of a lithotrite and the screw turned, the operator will distinctly recognize a certain recoil and spring of the instrument before the stone is crushed. This sensation requires to be studied in order to know how far the instrument may be taxed (when used unassisted by eyesight), on a bladder calculus.

FIG. 3088.—Gouley's Lithotrite.



Lithotripsy.

"To within a few years ago, Civiale's method of operating had been practiced with a considerable amount of success. The proceeding consisted in the breaking up of the calculus by the lithotrite, at one or more sittings, according to circumstances, the fragments being either partially removed by appliances, such as Clover's instrument, or allowed to escape spontaneously with the urine. Each sitting, or rather breaking of the calculus, was limited to a few minutes—there being a general agreement that anything like a prolonged use of the lithotrite was hazardous.

CYSTO-LITHIC.

LITHOTRITY. (Continued.)

This practice was attended, with few exceptions—where the stones were so small or so friable as to be crushed with one or two grips of the lithotrite—with the retention in the bladder, for varying periods, of pieces of rough and broken stone, which had no means of escape other than those mentioned. Here, then, was a fruitful cause of cystitis, which necessarily became a serious complication. Though this method has now been largely superseded by litholapaxy, some surgeons consider that there are cases to which the older method still remains applicable.”—“Observations on Lithotomy, Lithotritry,” &c. 1883. R. Harrison, F. R. C. S.

Evacuation of Débris.

FIG. 3089.—Van Buren's Evacuating Catheter and Bag.

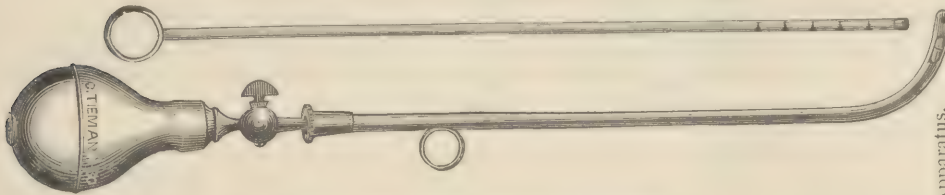


FIG. 3090.—Nélaton's Evacuating Apparatus.

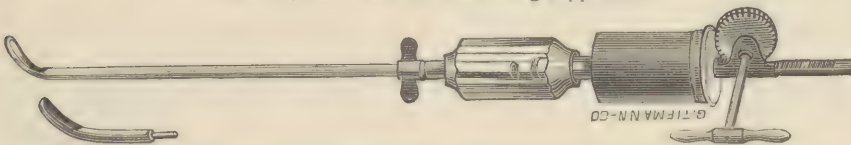


FIG. 3091.—Cornay's Washing Bottle (Lithérétique).

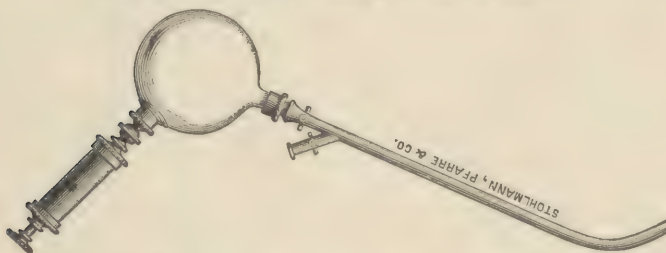


FIG. 3092.—Mercier's Washing Bottle.

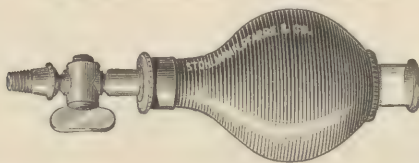
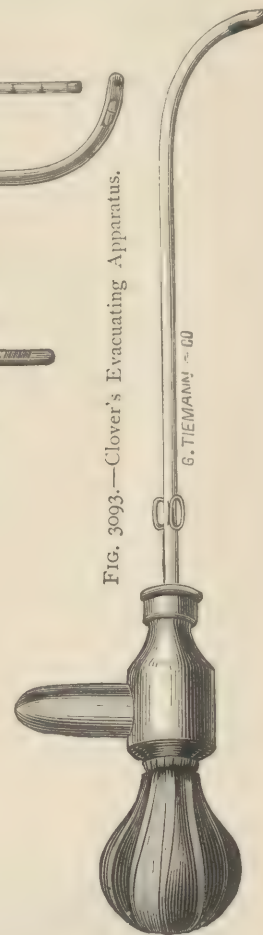


FIG. 3093.—Clover's Evacuating Apparatus.



“Various inventors, from time to time, devised evacuating tubes, to which syringes, rubber balls or evacuating pumps were attached. Among the most prominent names are those of Leroy d’Etiolles, Cornay, Mercier, Nélaton, Maisonneuve, Clover and Coxeter. Cornay’s lithérétique was described in 1845, one year before Crampton’s bottle, which it resembled in many respects, differing in that it combined the possibility of injecting the bladder through a double current catheter (Fig. 3045) with the principle of pneumatic aspiration. Mercier, in 1871, published a description of a washing bottle (Fig. 3092) made of rubber, oval in shape, with a glass receiver for fragments below. It very closely resembles in principle, and, indeed, in appearance, some of the first washers used by Thompson and Bigelow, and was worked without valves by alternate compression and relaxation of the rubber bulb filled with water, while the fragments collected below in the glass receiver. But Mercier did not dream of litholapaxy. He states distinctly that he had devised the washer for use, ‘*quand la retention devient complète*’—in other words, to help the bladder out when it should prove inadequate to the task of expelling the urine and the débris. Clover’s evacuating apparatus, having a glass receiver and a metallic catheter with large eye, or open at the end, is one of the best of the old type of instruments. The same tube, with a metallic pump above the receiver, is known as Nélaton’s evacuating apparatus.”—“Urinary Calculus,” by E. L. Keyes, A.M., M.D. “International Cyclopædia of Surgery,” Ashhurst. Vol. VI. 1886.

CYSTO-LITHIC.

LITHOLAPAXY.

Rapid Lithotrity with Evacuation.

"The following are the chief points connected with the modification in lithotrity which I have described, and for which I propose the above name.

"1. The calculus, although not necessarily pulverized, is crushed as rapidly and completely as is practicable. The dust and fragments are immediately evacuated, and a serious source of irritation is thus removed.

"2. This can be effected in a single operation.

"3. The operation—performed of course under ether—may be, if necessary, of one or two hours duration, or even longer.

"4. The method applies to larger stones than have been hitherto considered to lie within the province of the lithotritist. It also applies to small stones, nuclei, phosphatic deposits and foreign substances.

"5. Evacuation is best accomplished by a large tube, preferably straight with a distal orifice, the extremity of which is shaped to facilitate its introduction, and, during suction, to repel the bladder wall—and by an elastic exhausting bulb, which acts partly as a siphon. Below the latter is a glass receptacle for debris.

"6. The best size for the tube is the largest the urethra will admit.

"7. Such a tube is usually introduced with facility, if passed vertically as far as it will go toward the anus before changing its direction, and afterward directed almost horizontally, and passed by rotation through the triangular ligament. The first part of this rule applies also to the introduction of a lithotrite, and even a curved catheter. A free injection of oil is important.

"8. A small meatus should be enlarged, or a stricture divulsed, to allow the passage of a large tube.

"9. If the bladder be not small, a large and powerful lithotrite is always better than a small one.

"10. That this may have room for action, the escaping water should be replaced occasionally, through a tube inserted a few inches into the urethra by the side of the lithotrite. But the bladder should not be over distended.

"11. To save time, and also to prevent undue dilatation of the vesical neck, a non-impacting lithotrite is desirable. The jaws of a non-fenestrated instrument will not impact, if the male blade is furnished with alternate triangular notches by which the debris is discharged laterally, and also with a long thin spur at the heel fitted to a corresponding slot in the female blade—provided the floor of the female blade, especially at the heel, be made nearly on a level with its rim. To repel the bladder, the female blade should be longer and a little wider than is usual. It should have also low sides easily accessible to fragments—relying for strength less upon these than upon a central ridge below the heel. In the male blade of such a lithotrite the apices of the triangles should be a little blunted. Lastly, a non-fenestrated female blade protects the floor of the bladder, during a long sitting. A fenestrated instrument directs sharp splinters against it. The latter also delays the process of disintegration, by delivering through its opening the same fragments many times.

"12. In locking and unlocking a lithotrite repeatedly in a long operation, it takes less time and is easier to turn the right wrist, as in my instrument, than to displace the thumb of either hand in search of a button or a lever, as in previous instruments."—Henry J. Bigelow, M.D. Boston, May 25th, 1878.

FIG. 3094.—Bigelow's Lithotrite.

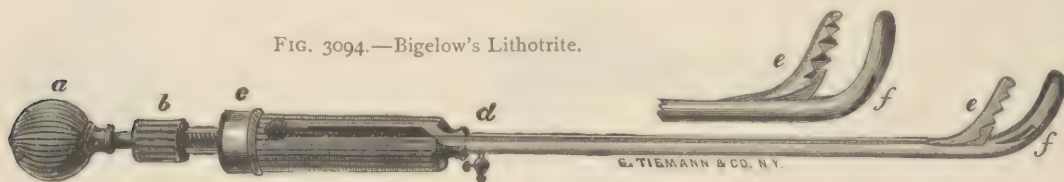
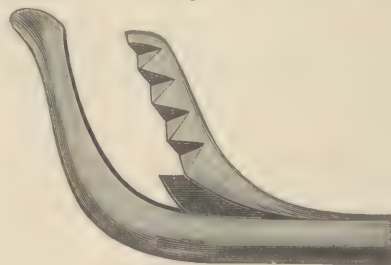


FIG. 3095.—Beak of Bigelow's Lithotrites (closed).



FIG. 3096.—Beak of Bigelow's Lithotrite (open).



The female blade of Bigelow's lithotrite has a long blunted toe to facilitate its passage through the urethra, while the male blade is deeply notched, and provided with a spur to drive out the debris and prevent impaction.

CYSTO-LITHIC.

LITHOLAPAXY.

Rapid Lithotrixy with Evacuation.

FIG. 3097.—Handle of Bigelow's Lithotrite (closed).

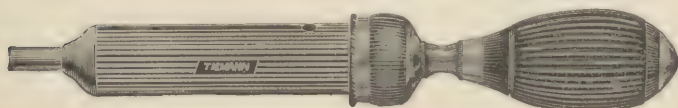


FIG. 3098.—Handle of Bigelow's Lithotrite (open).



The lithotrite of Bigelow is provided with an elongated vulcanite handle, shaped to fit the hand, the lock, represented open in Fig. 3098, is readily closed by a quarter revolution of the cover held between the thumb and index finger of the right hand, without compelling the operator to relax his hold upon the stone until it is well between the blades. It is represented closed in Fig. 3097.

Evacuation.

"The large evacuating tube (3, 4, 5) being the essential instrument in the new operation, a vacuum produced by almost any apparatus will draw fragments through it.

"An apparatus I early employed consisted of a stiff bulb (1) and Clover's trap, attached to the large catheter by a short elastic tube (2). The combination was a good one; for the elastic tube allowed the bulb, when in use, to be bent down to the level of the bladder. The bulb could also be laid on its side, and, by further depression, reversed; which brought the catheter tube to the top. It then remained only to open a trap at its lowest point and the fragments staid where they fell. This arrangement, placed on a stand, is practically the evacuator I still use.

"A strong bulb or bottle is here a very desirable substitute for the former slender one. In the glass trap (6) at the bottom of the instrument, the fragments are kept out of the current at a point distant from the catheter. After entering at the top of the bulb, they settle at once to the bottom and remain there undisturbed.

"If fragments are drawn through the tube with the force and rapidity that are given to the current by a strong elastic bottle, a few inches added to the length of the route are of no consequence. A short and curved elastic tube (here five inches long, but which I have varied from two inches to two feet) between the bottle and the catheter makes it possible to move one without the other. It relieves the surgeon and protects the patient. The surgeon can explore the bladder in search of fragments, without having to move the bulb, while the jar of pumping does not reach the bladder. The discomfort to the unetherized patient resulting from this jar is a serious objection to the rapid attachment of the bulb of water to the catheter. It should have a support of its own, placed upon the table or bed between the patient's legs, which may be separated a little, as in the case of the introduction of a catheter or lithotrite. The bulb, when thus near the level of the bladder, acts as a siphon. This is desirable. By experiments you will find that the difficulty of suction increases as the bulb is held higher than the evacuating tube. There is great advantage in keeping the bulb low, near the level of the bladder."—Henry I. Bigelow, M. D., *Medical and Surgical Journal*, Jan. 1, 1880.

"After trying several modifications of it, I must express my satisfaction, so far, with the original instrument. Exception has been taken to it on the grounds: 1. That the trapping of fragments is imperfect; 2. That the apparatus permits air to enter the bladder. Admitting the truth of these objections to some extent, I am not disposed to think that the utility of the instrument is thereby seriously impaired."—"Lithotomy, Lithotrixy," &c. R. Harrison, F. R. C. S. London. 1883.

FIG. 3099.—Bigelow's Original Evacuating Apparatus.

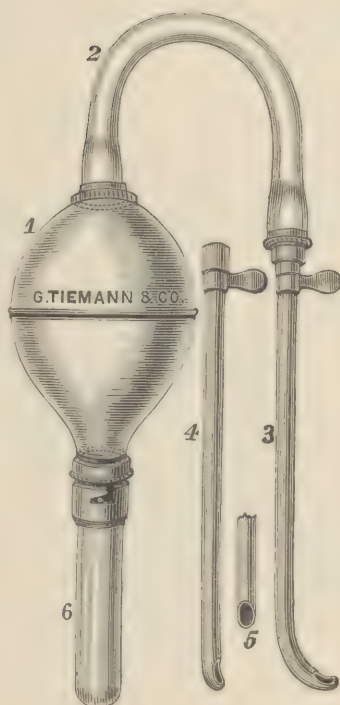


FIG. 3100.
Stand.

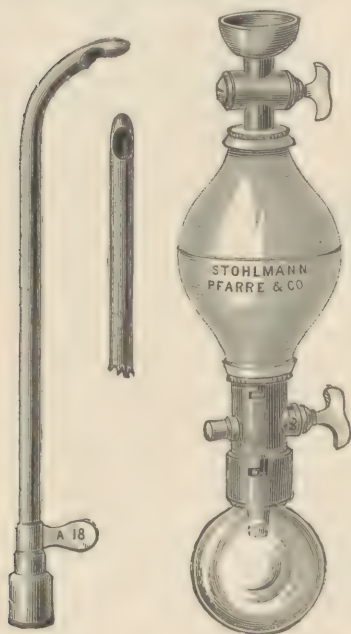


CYSTO-LITHIC.

LITHOLAPAXY.

Rapid Lithotritry with Evacuation.

FIG. 3101.—Thompson's Evacuator.



"The principle pursued by those who at an early period adopted the operation of crushing the stone, instead of cutting for it, was to proceed, little by little, to feel their way cautiously with the new proceeding, and accomplish as much progress as they could, but always subject to one important condition—namely, that the operator should do no mischief to the organs by any undue manipulation on his part. This was the practice long before anæsthesia was allied with surgery, and the lithotritist made it part of his business to watch the patient closely during the proceeding to ascertain whether he was distressed by it, and to modify it according to his sensibility and power of endurance. So much had this become a natural condition of the operation that, long after the use of ether and chloroform had become indispensable in all operations, lithotritry was performed by many without an anæsthetic agent. Hence it was the aim of the operator to cultivate a light and gentle, but quick hand; to do as much as possible in a short space of time, but also as gently and delicately as he could. Thus several sittings, varying in number from three to four, or to ten or twelve, were commonly necessary, according to the size of the stone.

"In time, however, anæsthesia became adopted also for lithotritry, and since employing it myself I have gradually diminished the number of sittings, and removed more débris on each occasion, so that from one sitting to four or five became at length as productive as the numbers before named. This progress was naturally in part the result of familiarity with the instruments and their use, acquired by many years of practice. I also employed more and more, during the last six or seven years, for the same purpose, and especially when the presence of irritation or inflammation made the removal of all fragments particularly desirable, the aspirator of Clover.

"About this time Mr. Bigelow, of Harvard, U. S., proposed, as a general rule, that the stone should, if possible, be crushed at one sitting, and removed entirely by a large aspirator and evacuating catheters, no matter how prolonged the time which might be necessary in order to accomplish the task. He believed that less damage would really accrue to the bladder and associated organs by a long, and even somewhat hazardous sitting, provided the viscus was emptied of the débris, than by the old process of taking away a little and often, but leaving always hard and broken fragments in the cavity, to produce continued and sometimes serious irritation there during much of the period necessary for repeated sittings.

"This was a bold, but I believe it was also a happy idea. My mind was already prepared by past experience to receive it favorably, although the means Bigelow employed in the shape of instruments, especially the lithotrites he proposed to use for the purpose, it was impossible for me to approve; and I at once tried the plan, and have to a very great extent carried it out during the past twelve months. I am bound to say, as far as I can judge, as far as now thirty-one consecutive cases thus managed enable me to determine, I think the principle a decided step of progress for lithotritry. Let the stone as to size be within the limit of the surgeon's powers, and let all be removed, or at all events the greater part of it, at the first trial. In attempting this, he should commence by crushing freely with a light but strong lithotrite, removing débris by the aspirator current afterwards. This done, the lithotrite is again introduced, if necessary, to deal with the remainder, and is again followed by the aspirator. If the rattle of fragments in the bladder against the end of the evacuating catheter still exists after its use, the lithotrite is to be again introduced to break them down, and another employment of the aspirator will perhaps complete the task. If only a few small pieces still remain, it is better perhaps to leave them than to subject the parts to repeated manipulations in order to remove some tiny portion. Such will do no harm, and may be removed at a second sitting. For the purpose of this mode of operating, I have modified my instruments somewhat. I have used one lithotrite, when necessary, slightly stronger than before, making the male blade more wedge-shaped, or rather like the prow of a ship—in part angular, in part more bluff or obtuse; this male blade protrudes through a small opening at the bottom of the female blade, so as to make blocking up impossible. And the original aspirator of Clover, the principle of which is maintained in its entirety, I have considerably modified, in a manner so that my new form of it offers three advantageous conditions: first, there is no possibility of air entering it; secondly, it ensures the shortest possible route into it from the bladder; and, thirdly, it has a globular trap at the bottom, into which the fragments enter, but which they cannot leave.

"Thompson's evacuator (Fig. 3101) consists of a stout india rubber bottle. On the upper part is a tap and above it a small funnel through which to fill the bottle. At the lower end is a tube with a tap attached, and a spherical glass receiver of about two and a quarter inches in diameter.

CYSTO-LITHIC.

LITHOLAPAXY.

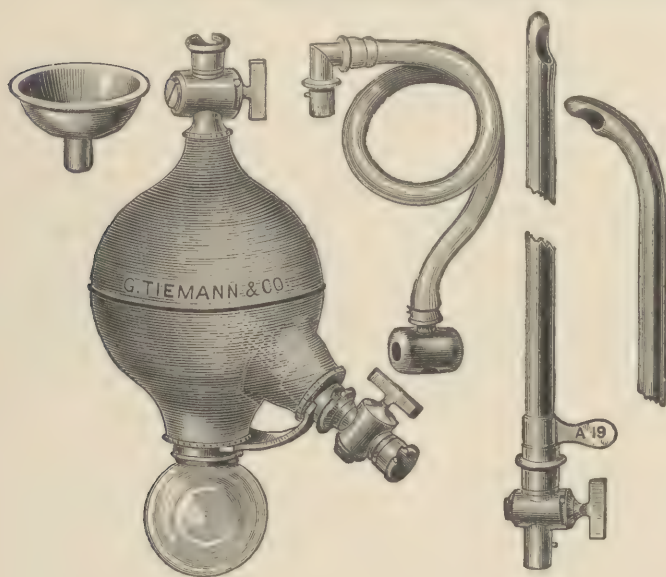
Rapid Lithotripsy with Evacuation.

"The apparatus acts thus: The evacuating catheter being in the bladder, it is attached to the tube. If the tap is now turned communication is established between the bladder and the apparatus, or cut off, as the case may require. To fill the instrument, the upper tap is opened, the lower one closed and water poured in by the funnel at the top. The water fills it directly and drives the air completely out; the upper tap is then closed and the instrument is then ready for use.

"The change in the situation and form of the lower tap shortens the distance many inches for the fragments to traverse, which thus reach the glass receiver by the shortest possible route. The current having less distance to travel, has a more powerful action on the fragments, consequently the aspiration is more perfectly made than it has hitherto been. The entry of air into the bladder is impossible, since the current leaves the lower part of the apparatus, and the air bubbles, if any, must rise to the upper part. In consequence, also, of its small size and portability, this instrument can be very easily adapted to an evacuating catheter, without necessitating any change in the position of the patient to be operated on. Lastly, for those who prefer a portion of flexible tube between the aspirator and the evacuating catheter, a portion is provided; two inches thus interposed will insure freedom from any jar to the bladder in using the instrument, and will only lengthen the route *pro tanto*. For myself, I prefer the absolutely direct and shortest route; having no more fear of hurting the bladder with the inflexible evacuating catheter than I have with the inflexible lithotrite."

—Sir Henry Thompson on "Lithotripsy at a Single Sitting." *Lancet*. June, 1880.

FIG. 3102.—Bigelow's Latest Evacuator. (1883).



"This evacuator is more simple in construction and aspirates more perfectly than any I have used. It is a compact modification of one formerly published in the *Lancet*, Sept. 24, 1881, as a 'simplified evacuator,' but without the stand of that instrument, which is not essential, and has been omitted because operators seem to prefer to do without it. It has an elastic bulb, glass receiver and stop-cocks. Below there is a metal brace between the collar of the glass receiver and that of the catheter to steady the latter. Within the bulb, and open at the end, is a tube strainer to prevent the return of débris. The bulb forms a concentric handle to the catheter. The tunnel and hose both fit on the top of the bulb; they belong to the apparatus, but are not essential to it."—*London Medical Record*, Aug. 15, 1883.

Otis' Evacuating Catheters.

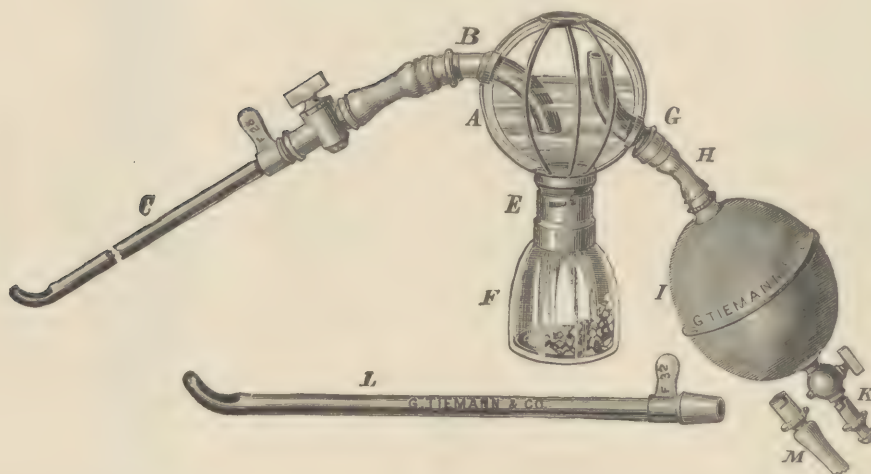
"The facility and safety of removing the débris from the bladder, in litholapaxy, depends, in a very important degree, on the *size and shape* of the evacuating tube or catheter. Professor Bigelow recommends that the size shall not be below 25 millimetres in circumference, nor above 31 millimetres. For my own part I have never yet met with a normal adult urethra of less than 28 millimetres in circumference. He uses, and recommends, the straight evacuating tube, in preference to the curved. The calculous débris finds its way through it much more directly and easily, and, while less liable to become clogged, it is more readily cleared. The only objection appears to be the somewhat greater difficulty of introducing it into the bladder, especially in cases of enlargement of the prostate. I have modified the straight instrument of Professor Bigelow by adding a small curved projection, *CL* (Fig. 3103), which, with all the advantages of the former, I have found more easy of introduction, and preventing, in greater degree, the closure of the opening in the tube, from engagement of mucous membrane in it, during the process of evacuation."—F. N. Otis, M. D. *Medical Record*, November 3, 1883.

CYSTO-LITHIC.

LITHOLAPAXY.

Rapid Lithotritry with Evacuation.

FIG. 3103.—Otis' Evacuator.



"Notwithstanding their excellence in other respects, the weight and size of the different evacuators had often occurred to me as an objection. After careful experimental study of the matter, bearing in mind the excellent points of all the instruments in use for this purpose, the plan of a new instrument was evolved by me, and elaborated by the surgical cutlers, Geo. Tiemann & Co. It consists of an annealed glass bulb, *A*, two inches in diameter, the reservoir, into one side of which a metal tube, *B*, forty millimetres in circumference, curving down to its lowest part, is inserted. This is connected to an evacuating catheter, *C*, by a short india rubber tube. Attached to the floor of the reservoir by a bayonet joint, *E*, is a short, strong glass bottle, *F*, the receiver. On the side of the bulb, opposite the tube connecting with the evacuating catheter, is another metal tube (at *G*), curving upwards to near the top of the bulb, *A*. This is connected by another flexible tube, *H*, with a strong india rubber bulb, *I*, constituting an independent air-chamber. A stopcock at the extremity of the flexible tube, *B*, permits the removal of the catheter without leakage from the reservoir, *A*. The capacity of the reservoir, *A*, is just four fluid ounces; that of the receiver, *F*, one and one-half ounce. The instrument, in the position shown, may be emptied of the contained air by firm compression of the bulb, *I*, and the evacuating catheter placed in a vessel containing sufficient water, when, by removing the pressure, the instrument fills instantly and is then ready for use.

"*Directions for Operating.*—The evacuating catheter having been well oiled and carefully introduced into the bladder, the contained urine is evacuated, and six to eight ounces of tepid water are introduced into the bladder. The evacuating catheter is then attached to the evacuator. Gentle pressure of the bulb—sufficient to displace one-third to one-half of its contained air—drives a current of water into the bladder and produces the necessary vacuum. The returning current from the bladder brings a portion of its contained water, and with it the calculous débris. This is quietly, quickly and certainly deposited into the receiver, from which there is no possibility of return into the bladder. Repeating the pressure on the bulb at intervals of two or three seconds, as long as fragments are seen to fall into the receiver, the catheter, the point of which has been in contact with the most dependent portion of the bladder, is then withdrawn a little and gently moved about, in order that floating or reluctant fragments may find access to it, and the rhythmic pressure of the bulb is continued, until no more débris is seen to fall into the receiver. If, then, there are evidences that calculous material still remains in the bladder after removal of the evacuating catheter, the crushing is renewed, after which the same operation for removal of débris is repeated, and so on, until the stone is completely removed."—F. N. Otis, M. D., &c. *Medical Record*, November 3, 1883.

N. B.—"The readiest and best way of filling the instrument is to plunge the evacuating end into a vessel of water, of a temperature of 98°, and, by one or two firm compressions of the rubber bulb, the filling is complete and the evacuator is ready for use. If, during the operation, it is found desirable to introduce additional water into the bladder, this is done with great ease, by attaching the discharge pipe of a Davidson's syringe to the stop-cock (at *K*), while the supply end is immersed in a vessel (preferably a large glass graduate), filled with water of a proper temperature. The easy attachment and detachment of the Davidson's syringe, allows any desired amount of fluid to be introduced into the bladder without delay or inconvenience."—F. N. O., Feb. 4th, 1885.

CYSTO-LITHIC.

LITHOLAPAXY.

Rapid Lithotritry with Evacuation.

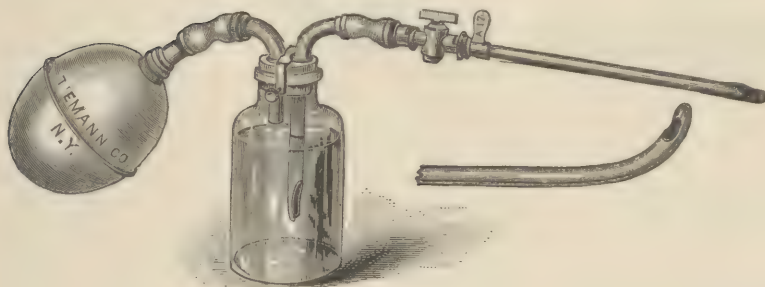
FIG. 3104.—Sir Henry Thompson's Latest Evacuator, modified by Weiss.



"This," says Sir Henry Thompson, "is identical with Fig. 3101 in every particular, except that the cylindrical receiver, which is (in Fig. 3101) directly under the bottle and may be influenced by currents, is removed to the front of it, and is perhaps less disturbed by the current which passes over the mouth of the receiver." In neither of these is any stand required, and the connection with the bladder is the shortest and simplest possible. The connection of the aspirator with the bladder is also cut off by the taps.

"*Cocaine in Litholapaxy.*—Professor Bruns reports a case in which he obtained local anæsthesia of the bladder and urethra by injecting a cocaine solution, with the most gratifying results. The patient, a young man, had suffered for four years from stone in the bladder. Chronic cystitis was present, and evening feverishness. The injection of one gramme mostly into the bladder itself, in a two per cent. solution, but also a little into the urethra, produced complete local anæsthesia for half an hour, during which time a very hard oxalate of lime calculus was thoroughly crushed, and removed without pain. After the injection, the patient assumed a different position, to bring the fluid into contact with the whole inside of the bladder; and, after the operation, a little of a ten per cent. of iodoform-glycerine emulsion was injected. The recovery was uninterrupted."—*British Medical Journal*.

FIG. 3105.—Walker's Evacuator.



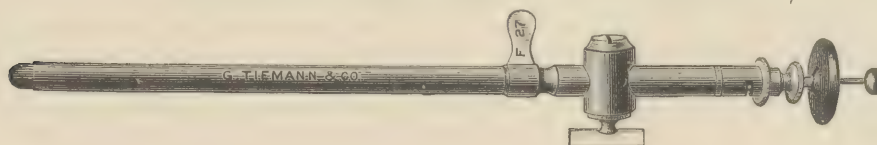
"The instrument consists of a six-ounce wide-mouthed glass bottle, fitted with a rubber stopper having two openings through it for the introduction of two metal tubes; one short, extending down about half an inch below the stopper, and the other long, extending to within an inch of the bottom of the bottle, with an oval (side) opening. These are held in place by a steel flange over the stopper, and fastened by a screw.

"The metal tubes are curved

at their upper extremities, both having for a medium of connection a short piece of rubber tubing. To the short one is attached a rubber bulb, and to the long one the evacuating-tube, with stop-cock and bayonet connections. The evacuating catheters vary in size and are of the usual shape. For use the bottle is to be filled with warm antiseptic water just to clear the opening of the short tube. After the introduction of the evacuating catheter into the bladder, it will be well, before making the connection with the long tube, to exclude the air. This can be done by forcing water into it by slight pressure upon the bulb and then closing the stopcock. Everything being in readiness, the connection is made, the stop-cock opened and gentle pressure made upon the bulb, so as to force out from the bottle about an ounce and a half of water, when, by a sudden relief of pressure upon the bulb a return current takes place, bringing with it broken calculus. The repetition of this manœuvre is kept up until the operation is completed."—H. O. Walker, M. D., &c., Detroit, Mich. *Medical News*, January, 1885.

Keyes' Evacuating Tubes.

FIG. 3106.—Keyes' Straight Evacuating Tube, with Obturator.



CYSTO-LITHIC.

LITHOLAPAXY.

Rapid Lithotrity with Evacuation.

Dr. Keyes has advocated, under certain circumstances (*Medical Record*, November 11, 1882), a straight evacuating tube, open at both ends. This is shown as now used by Dr. Keyes in Fig. 3106.

Dr. Keyes' curved evacuating tube—a short curved sound for purposes of introduction, a straight tube in all the essentials for washing—is shown in Fig. 3107. Both tubes have leather packing on the rod carrying the obturator, and, being furnished with stop-cocks, may be used without wetting the bed.

FIG. 3107.—Keyes' Curved Evacuating Tube, with Obturator.

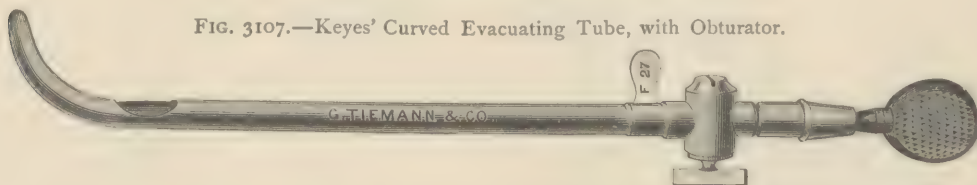
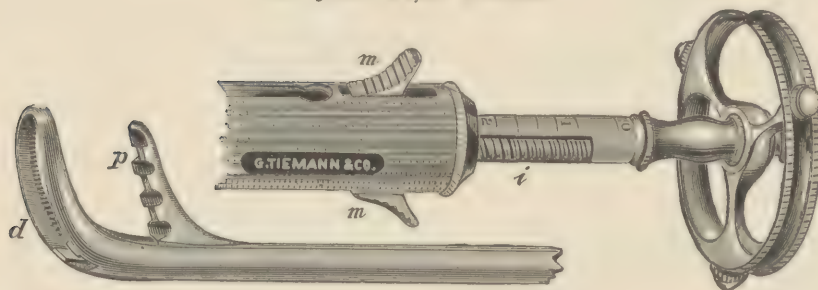


FIG. 3108.—Keyes' Lithotrite.



Dr. Keyes employs three sizes of lithotrites. Fig. 3108, *m, m, i*, shows the handle of the instrument. The pattern of the jaws, *d, p*, is the same in all. The three sizes are to accommodate variations in the size and hardness of the stone. He says: "I prefer the Reliquet pattern of roughening the male blade.

The instrument is narrow, but exceedingly strong. It grasps well, and cannot clog. With any reasonable care it is unlikely to catch a fold of the bladder in its bite. In the handle of my larger lithotrite I have placed two buttons, *m, m*, so that any finger of either hand, in any position, may strike a button easily and promptly connect the screw. Either button works alone, or they work together. They are saddle-shaped, high and much easier to work than those of the older patterns. The larger instrument will lock upon a stone two and a half inches in diameter."

FIG. 3109.—Jaws of Keyes' Large Lithotrite.

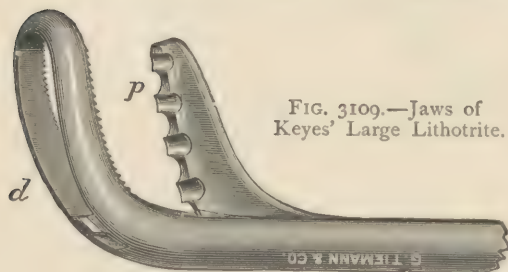


FIG. 3110.—Chismore's Evacuating Lithotrite.



"It is a lithotrite and evacuating tube combined, and so made as to be readily connected with Bigelow's, Otis', Sir Henry Thompson's, or any other form of aspirator. The screw power and lock usually found on lithotrites have been omitted, as it is not intended for use in the beginning of operations on stones of considerable size or unusual hardness; in such cases the first crushing and aspiration should be made with the usual instruments, after this it will be found that the hands of the operator are quite powerful enough to crush even large fragments without difficulty."

CYSTO-LITHIC.

LITHOLAPAXY.

Rapid Lithotritry with Evacuation. Chismore's Evacuating Lithotrite. (Continued.)

"Modus operandi.—First draw the urine and then inject an ounce of a four per cent. solution of muriate of cocaine into the bladder through a silver catheter. Then soap the tube of the male blade of the instrument to make the joint air-tight, put it together and introduce into the bladder. When *in situ* the jaws are opened an inch or more, an aspirator coupled on, and about four ounces of a warm solution of biborate of soda injected into the bladder, in addition to the solution of cocaine already there. The solution of cocaine remaining, mixed with the other fluid, passes in and out of the aspirator and bladder as the bulb is compressed and relaxed, agitating the fragments of stone in all directions, while the outflowing current sucks them between the open jaws of the instrument, where they are ground down to the proper size to be drawn out."—From a paper by George Chismore, M.D. Read before the Medical Society of the State of California, April, 1886.

THE ANCIENT STONE OPERATIONS.

Lithotomia, Cystotomia, Urolithotomia, Sectio Vesicalis, Lithocystotomy.

"1. THE METHOD OF CELSUS.—This consisted in cutting upon the stone after having made it to project at the perinæum by means of the fingers introduced into the rectum. The method was attended with several inconveniences; such as the difficulty of dividing the parts neatly, injury done to the bladder, as well as the impossibility of drawing down the stone in many persons. It is sometimes called *methodus Guytoniana*; from Guy de Chauliac having endeavored to remove from it the discredit into which it had fallen in his time. It was termed *apparatus minor*, from the small number of instruments required in it.

"2. APPARATUS MAJOR.—This method was invented in 1520, by John de Romani, a surgeon of Cremona, and communicated by him to Mariano Santo di Barletta, whence it was long called *Mariano's method*, *sectio Mariano*. It was called, also, *apparatus major*, and *cystotomia seu methodus cum apparatu magno*, from the number of instruments required in it. An incision was made on the median line; but the neck of the bladder was not comprehended in it. It was merely dilated. The greater apparatus was liable to many inconveniences: such as ecchymosis, contusion, inflammation of the neck of the bladder, abscesses, urinary fistulæ, incontinence of urine, impotence, &c. A modification of this method, by Mr. John Allarton of England, has been called the *median* or *Allarton's operation*. It consists in dividing the perinæum and the membranous portion of the urethra, passing a probe down to the staff and into the bladder, as a guide for the finger through the prostatic portion of the urethra into the bladder, thus dilating the passage so as to allow of the introduction of the forceps.

"3. THE HIGH OR SUPRAPUBIC OPERATION, *apparatus altus*, *cystotomia cum apparatu alto*, *cystotomia hypogastrica*, *lithotomia supra pubem*, *epicystotomia*, *laparocystotomia*, *sectio seu methodus Franconiana*.—It was first practiced by Peter Franco, about the middle of the sixteenth century. It consisted in pushing the stone above the pubis by the fingers introduced into the rectum. Rousset afterwards proposed to make the bladder rise above the pubis by injecting it. The method had fallen into discredit, when Frère Côme revived it. It is used when the calculus is very large. It was practiced by opening first the membranous part of the urethra upon the catheter passed into the canal. Through this incision the *sonde à dard*—a species of catheter, having a spear-pointed stilet—was introduced into the bladder. An incision was then made into the linea alba, above the symphysis pubis, of about four or five fingers breadth, and the peritoneum detached to avoid wounding it. The stilet was pushed through the bladder and used as a director for the knife, with which the bladder was divided anteriorly, as far as the neck, and the stone extracted. It was performed in England by Douglass, in 1719, and since by others with various modifications.

"4. THE LATERAL OPERATIONS, *hypocysteotomia*, *cystotomia lateralis*, *cystauchenotomia*, *cystotrachelotomia*, *urethrocystauchenotomia*, *urethrocystotrachelotomia*, *sectio lateralis*, *apparatus lateralis*.—So named from the prostate gland and neck of the bladder being cut laterally, was probably invented by Peter Franco. It was introduced into France by Frère Jaques de Beaulieu. He performed it with rude instruments invented by himself, and improved by the suggestions of some of the Parisian surgeons. In England it received its earliest and most important improvements from the celebrated Cheselden. It is the method practiced in the present day, according to different modes of procedure. In this method the patient is placed upon a table; his legs and thighs are bent and separated; the hands being tied to the feet. The perinæum is then shaved and a staff introduced into the bladder, the handle being turned towards the right groin of the patient. An oblique incision is then made from the raphé to the middle of a line drawn from the anus to the tuberosity of the ischium of the left side; and, taking the staff for a guide, the integuments, areolar tissue of the perinæum, membranous

CYSTO-LITHIC.

THE ANCIENT STONE OPERATIONS.

Lithotomia, Cystotomia, Urolithotomia, Sectio Vesicalis, Lithocystotomy. (Continued.)

portion of the urethra, transversus perinæi muscle, bulbo-cavernosus, some fibres of the levator ani, the prostate and neck of the bladder, are successively divided. For this latter part of the operation, the knife, the beaked bistoury, *bistoury ou lithotome caché*, cutting gorget, &c., is used, according to the particular preference. The forceps are now introduced into the bladder and the stone extracted. In the operation care must be taken not to injure the rectum or the great arterial vessels distributed to the perinæum. The method of Le Cat and of Pajola—urethrocystoœneurysmatotomia—consists of dividing the prostate in part only—the enlargement of the wound being effected by a peculiar dilator.

“5. LITHOTOMY BY THE RECTUM—*recto-vesical-lithotomy, proctocystotomia, sectio rectovesicalis*.—This was proposed by Vegetius in the sixteenth century; but it was never noticed until M. Sanson, in the year 1817, attracted attention to it; since which time it has been successfully performed in many instances. It consists in penetrating the bladder through the paries corresponding with the rectum by first cutting the sphincter ani and rectum about the root of the penis, and penetrating the bladder by the neck of that organ, dividing the prostate, or by its *bas-fond*.”—DUNGLISON.

THE MODERN LITHOTOMY OPERATIONS.

Practically the surgeon requires but three operations to meet the necessities of all cases; they are:

The *lateral*, the *median*, and the *high operation for stone*.

The *condition of the stone calling for lithotomy* are four:

Size, number, composition, position.

“1. *Size*.—If a stone is decidedly over medium (one inch diameter) size and, at the same time, composed of anything except the phosphates.

“2. *Number*.—Most cases of multiple stone do better if cut.

“3. *Composition*.—If the stone is small, its composition is a matter of not much importance; if much over an inch, it is all important. The constant appearance in the urine of uric acid, oxalate of lime, or the mixed phosphates, or the examination of the gravel or small stones previously passed by the urethra (if any), will often throw great light on this subject, as will also the click when the exploring instrument strikes the stone, the sound being sharp and clear for hard, dull for soft stones.

“4. *Situation*.—Encysted stones, if molested at all, require the knife. Severe general or local disease (especially cancer or Bright's disease), unnatural size of stone, advanced age, and debility, make it often advisable to palliate rather than assume the risk of any operation, especially among the wealthy, who can command every comfort.

Choice of Operations.

“*Choice of Operation*.—Having now decided what cases of stone require lithotomy, it remains to discuss the circumstances calling for one or the other operation. Young children do well by any operation, but the lateral is undoubtedly the best, as the incision is not liable to injure the seminal ducts, and a free outlet is afforded for the extraction of the stone. If the latter is quite small, the medium operation is, perhaps, as good; but, where it is large, the violence done in dilating the vesical neck is objectionable. It is exceedingly rare for children to have infiltration of urine, although the limits of the prostate are undoubtedly often surpassed by the incision in the lateral operation. Peritonitis from violence is what is to be feared in children, and there is little danger of this (even with large stones) from the lateral operation. The median section, however, in children, has the advantage of being generally attended with less hæmorrhage, and is useful for small stones; the older the child, the less objectionable the operation.

“With the adult, the same rule holds good—the median operation for small stones, the lateral for large. But small stones in the adult are preferably dealt with by lithotrity; hence the application of the median method is rarely advisable, except under two circumstances, namely, where there are many stones, all small, and where, with a single small stone (less than one inch in diameter), the patient's irritability is such that chill or constitutional disturbance follows every attempt to use instruments in the bladder. Where the stone is small or large, but the bladder more than ordinarily irritable and inflamed, the lateral operation, with free incision of the prostate and vesical neck, is to be preferred. In the case of very large stones and, indeed, as a matter of prudence for all stones over one and a half inches in diameter, a modification of the lateral operation is called for, namely, bilateral section of the prostate to make more room for extraction; or, if the stone shows exceptional proportions, the combination of crushing with cutting (perineal lithotrity) and extraction of the stone in fragments, or the supra-pubic operation.”—“*Genito-Urinary Diseases with Syphilis*.” Van Buren and Keyes. 1874.

CYSTO-LITHIC.

LITHOTOMY.

Apparatus for Securing a Patient in the Position for Lithotomy.

FIG. 3111.—Pritchard's Anklets and Wristlets.

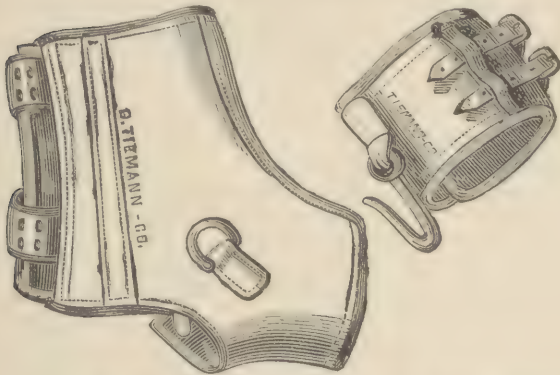


FIG. 3112.—Peter's Substitute for the Wrist and Ankle Band.



Pritchard's anklets and wristlets are made of stout leather and padded. The wristlet is furnished with a strong hook, and on either side of the anklet is a ring of metal. The pieces are put on separately and hooked up after anæsthesia is complete.

"Peter's substitute for the wrist and ankle band consists of an iron rod sliding within a hollow one, for the purpose of rendering it longer or shorter. At each end of the rod is a padded leather strap, which is to be buckled around the leg just below the knee; a long padded strap is then fastened to one of the buckles near the end of the connecting rod, carried behind the patient's neck and fastened to the buckle at the other end of the rod. It enables one to dispense with one or two assistants, as the one giving

ether can also keep the patient from rolling to either side, by simply grasping the connecting bar with one hand, leaving the other free. It also secures a thorough stretching of the perineum, lifts the legs and feet completely out of the way, and enables you to fetch the nates well down beyond the edge of the table, which is often very desirable."—*New York Medical Record*, December 9, 1882.

"The high operation for stone, designed by Franco in 1561, has still a respectable advocacy. It is applicable only to large stone, where the choice must otherwise be a perineal operation, with the additional danger of crushing *in situ*; or, recto-vesical section, with its possible resulting fistula; and, finally, in cases of deformed pelvis. Humphrey,* who speaks

with authority upon the subject, and is quoted by Thompson, states that the dangers in the high operation do not increase in so great a ratio with the size of the stone as they do in the lateral operation."—"Genito-Urinary Diseases with Syphilis." Van Buren and Keyes. 1874.

"The *Bilateral Operation* is founded on that of Celsus. It consists in making an incision posterior to the bulb of the urethra, and anterior to the anus, involving both sides of the perinæum by crossing the raphé at right angles: an incision is then made through the membranous part of the urethra, and the prostate may be cut bilaterally, either with the double lithotome of Dupuytren, or a prostatic bisector. * * * * *

"*Buchanan's Operation*.—Dr. Buchanan, of Glasgow, suggested the use of a rectangular staff (Fig. 3122), the angle being placed about three inches from the point, the portion beyond the angle being deeply grooved at the side. When introduced, the angle of the staff is made to correspond to the apex of the prostate. The surgeon, introducing his finger into the rectum, inserts a bistoury in front of the anus, with the blade horizontal and its edge turning to the left, pushing it straight into and along the groove to the stop at its extremity. While slowly withdrawing the bistoury, he makes a curved incision through the soft parts, about an inch and a half long, around the upper and left side of the rectum.

"The *Quadrilateral Operation*, proposed by Vidal de Cassis, was a modification of the bilateral operation, to be employed when the calculus was unusually large; but it was quadrilateral only so far as the number of prostatic incisions was concerned, the external incision being bilateral."—DUNGLISON.

* "Transactions of the Providence Medical Association." 1850.

CEYSTO-LITHIC.

LITHOTOMY.

1. The Lateral Operation.

"The lateral operation dates back to Pierre Franco, of Provence, about the middle of the sixteenth century, and claims the names of Jaques in the seventeenth century, and Rau, his pupil, in the eighteenth. It was popularized and practiced with great success in England, by Cheselden, in the last century, and it is his operation which is still performed.

"*Instruments employed.*—The instruments necessary for the operation are the *searcher* (Fig. 3065), a *staff* of proper size with a long curve deeply grooved on its convexity (Fig. 3119), the groove encroaching on the right lateral aspect of the staff toward the point. The handle of the staff should be broad, heavy, and marked with deep crossed lines, so that it may be held firmly with ease. The groove should not run off at the beak, but stop abruptly, leaving the last quarter of an inch blunt and round. The *scalpel* should be firm, seven or eight inches long, with a stout shank and solid back, the blade about three inches long (Fig. 3123), the cutting edge about one and a quarter inch. *Blizard's probe-pointed knife* (Fig. 3120, English pattern), long, straight, with a stiff back, and (Fig. 3121, American pattern), stout plain or ribbed handle. The *blunt gorget*, possibly useful where the patient is fat and the perinæum deep (Fig. 3134). The *scoop* (Fig. 3136). *Several forceps* of different sizes, with extremities roughened in the inside to hold the stone firmly, one with crossed handles (Fig. 3141), so as to be opened sufficiently in a deep perinæum without stretching the wound unduly; another with its blades sharply curved (Fig. 3139), so as to catch stones behind the pubes or in the *bas fond*. A *lithoclast*, or heavy pair of forceps with a central raised ridge of heavy teeth pointing backward (Fig. 3152) in each blade, to catch and break stones which are found too large to extract safely, with an extra screw for attaching to the handles to draw the jaws together; or, for the same purpose, an instrument known as *Maisonneuve's* (Fig. 3155). A *metallic débris tube* (Fig. 3165) with an open end, and a large eye—furnished with an obdurator for easy introduction—through which to wash out débris. A *débris syringe* with a tube, one-sixth inch diameter, provided with a globular head, having holes pointing backward. A *shirted canula* for hæmorrhage (Fig. 3170). A *tenaculum* (Fig. 3142). *Pritchard's anklets and wristlets*. A soft French olivary catheter, brandy, hot and cold water, sponges, towels, ligatures, ether, &c. These make up the list of instruments. At least five assistants are necessary: one for the ether; one to steady each knee; one—the post of honor—to hold the staff; one to sponge and act as general assistant.

"*The Operation.*—The patient is prepared beforehand as for any capital operation, and, in addition, has the perinæum shaved, and receives a full enema about two hours before the operation, to clear the rectum, after which he abstains, if possible, from again passing water. He should be etherized in bed, and then carried to a small, firm table, and comfortably arranged on an old blanket. The anklets and wristlets are adjusted (or the hands and feet bound together with bandage). The pelvis is now drawn to the lower edge of the table, facing the light, a piece of old carpet and a pan with saw-dust placed beneath to catch the blood and urine. The operator passes the staff, feels the stone with it, and then entrusts it to his assistant of honor, and, taking his seat on a low stool, facing the patient's pelvis, with all his instruments systematically arranged within easy reach of his right hand, is in readiness to commence. Should the staff fail to strike the stone, it may be withdrawn and the searcher introduced. Should this also fail to detect it, after a careful and prolonged sounding, the operation should be deferred. Some of the best operators have been deceived in their diagnosis, and have cut patients in whom no stone existed; so that it has become a cardinal rule never to cut a patient in whom the stone cannot be felt after he is upon the table. The sound may fail to detect it, if it lies in a deep *bas fond*, but not so the searcher. The holder of the staff usually satisfies himself that the sound strikes the stone. It is not essential that the end of the staff should rest against the stone. As long as it is certainly in the bladder, nothing more is required. The chief assistant stands at the patient's left, holds the staff vertically, steadily, and firmly hooked up under the symphysis, with its long curve a little bellied out in the median line of the perinæum, and keeps the integument of the latter taut by pulling the scrotum up around the staff. The assistants steady the knees, while the operator impresses his mind firmly with the shape and size of the long outlet of the pelvis by running his finger down the rami of the ischium, touching their tuberosities, feeling the symphysis pubis and the coccyx. The surgeon should picture to himself a pelvis lying before him, in position, denuded of soft parts, and recall the general inverted heart-shape of its outlet. The operator now introduces the left index finger into the rectum, assures himself that the sound enters the apex of the prostate and passes centrally through its canal, and that the rectum is empty and collapsed. Then, withdrawing his finger, he searches with the thumb or finger of his left hand upon the raphé of the perinæum, for the groove in the staff, which, in a thin person, can always be obscurely felt. If he cannot feel it, he takes the handle of the staff from his assistant and, by depressing it several times, while he makes pressure upon the perinæum, he satisfies himself of the position of the groove and returns the staff to his assistant.

"The scalpel is now entered a little to the (patient's) left of the raphé, from one and a quarter to one and a half inch in front of the anus, the point of the knife, guided by the nail, being made to enter the groove of the sound and open the urethra at the first cut. If the point enters the groove, it is to be pushed along for a quarter to half an inch; if it fails to strike the groove it is made to pierce more or less deeply—and then, with a single bold stroke, the first incision is made laterally to the right, about three and a half inches long, terminating exactly midway between the tuber

CYSTO-LITHIC.

LITHOTOMY.

Staffs, Directors and Knives.

FIG. 3113.—Little's Director for Median Lithotomy.

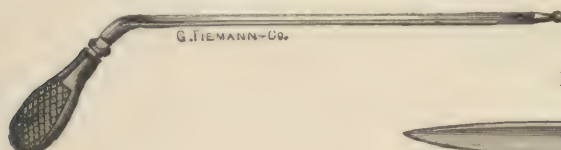


FIG. 3114.—Little's Lithotomy Bistoury.



FIG. 3115.—Little's Lithotomy Staff.

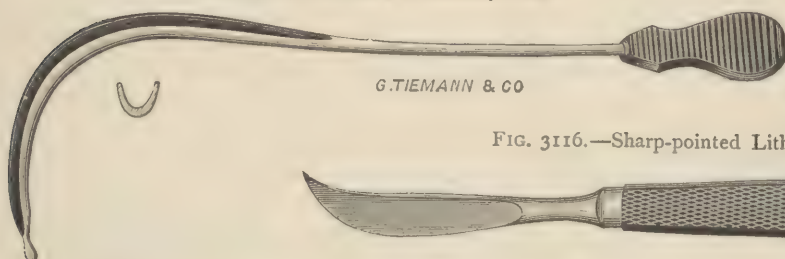


FIG. 3116.—Sharp-pointed Lithotomy Scalpel.

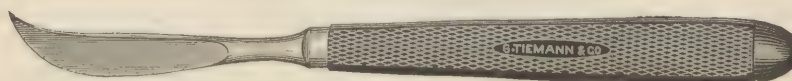


FIG. 3117.—Markoe's Lithotomy Staff.

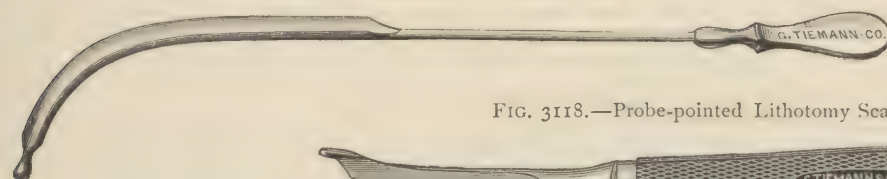


FIG. 3118.—Probe-pointed Lithotomy Scalpel.



FIG. 3119.—Steel Staff.

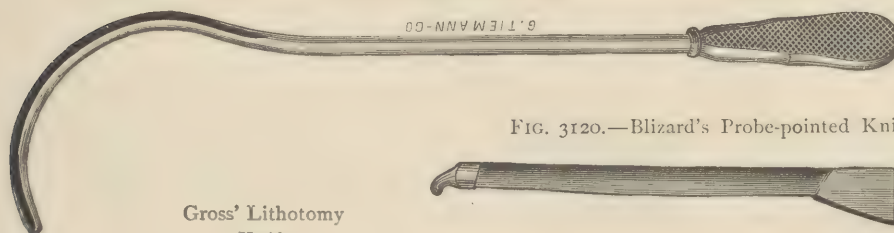


FIG. 3120.—Blizard's Probe-pointed Knife (English).



Gross' Lithotomy Knife is like Fig. 3121, but sharp pointed.

FIG. 3121.—Blizard's Probe-pointed Knife (American).



FIG. 3122.—Buchanan's Rectangular Staff.



FIG. 3123.—Lithotomy Scalpel (Depruyten's).



CYSTO-LITHIC.

LITHOTOMY.

1. The Lateral Operation. (Continued.)

ischii and the anus. The scalpel is again entered into the groove, and the urethra amply opened. The practiced lithotomist sometimes uses the same knife to complete the operation, but, as a rule, it is better at this stage to change the scalpel for Blizard's knife. The probe point of the latter, following the guiding index finger, is passed into the groove, and the surgeon takes the handle of the staff, depresses it somewhat, and, following the groove, pushes his knife along until its point is arrested by the abrupt termination of the groove at the end of the staff. He now increases the angle between his knife and the staff, by depressing the handle of the former, and, remembering the position and shape of the prostate, he cuts his way out, his incision through the prostate being at about an angle of 30° with the horizon, the external incision at an angle of about 50° . A gush of urine usually follows this incision. If the external incision has not been bold enough, it may now be enlarged with a few strokes of the scalpel. Having now completed the incisions, the index finger of the left hand should be gently introduced into the bladder, and the sound withdrawn. The finger usually comes at once in contact with the stone. The bladder's neck is now to be dilated slowly but thoroughly with the finger—if the perinæum be deep with fat, with the blunt gorget, carried in along the groove of the staff. If the stone has been previously measured, and is less than one inch in diameter, or if there are many small stones, the surgeon should proceed to extract at once. If, however, the stone is above one inch in diameter, Blizard's knife should be re-introduced on the finger and the prostate cut on the (patient's) right side. After being satisfied that the neck of the bladder is nicked, the prostate sufficiently cut, the whole wound dilated and dilatable, the forceps is passed into the bladder as the finger is withdrawn. One blade is depressed into the floor of the bladder, the other is widely opened, and usually, on closing them, the stone will be caught. Failing in this, search laterally and further back in the bladder must be made, the direction of the blades being changed, until the stone is seized. In cases of deep perinæum the small end of the scoop is introduced, until it touches the stone, and then the forceps is followed along upon the scoop as a guide until it enters the bladder and strikes the stone. It should never be forgotten during these manoeuvres that the bladder, usually already much inflamed, is often nearly empty, claspings the stone, and that any roughness or force may inflict serious (perhaps fatal) injury upon the patient. The utmost gentleness, deliberation and care are necessary during this stage of the operation; indeed, the catching and skillful extraction of the stone are often a more delicate proceeding than any other part of the operation. If it is found that the stone has been seized in a faulty diameter, it should be dropped or pushed out of the jaws of the forceps, perhaps rolled over with the finger, and another attempt made to catch it correctly. Extraction should be slow, the traction being made in the line of the external incision, downward and outward. Lateral motions should be given to the forceps during extraction, the force being about two-thirds lateral, one third extractive. It must be remembered that the most fatal source of danger in lithotomy is bruising and lacerating the neck of the bladder in forcible efforts at removing the stone; and if, after the exercise of a sufficient amount of force—the amount to be learned only by experience—the stone will not engage in the outlet of the bladder, it is far more brilliant morally, and better surgery, to break the stone and carefully extract the pieces than to remove by force a handsome specimen to show, with the risk of having to attach to its history, "Result fatal."

"After one stone has been extracted, if it is found to be smoothly rounded and presenting no facets, there is probably no other present; if it has facets, the reverse is almost, if not quite certain to be the case. Phosphatic calculi are often multiple, uric acid less commonly so, oxalate of lime often single. In any case, after extracting one stone, careful search should be made for another with the searcher and the small end of the scoop through the perineal wound. Should any stone break during extraction, and in those very rare cases where a quantity of *débris* is found in the bladder, partly adherent to ulcerated patches of mucous membrane, the large end of the scoop is to be used to spoon out the earthy matter, and then copious injections of tepid water are to be thrown into the bladder with the bulbous headed irrigator (Fig. 3164) until the bladder is clean. When the stone is found to be encysted, or fixed in position by some faulty contraction of the bladder behind the pubis, or in the fundus, the dexterity of the operator may be taxed to seize it with the forceps, but intelligent efforts, gently and carefully prolonged, will usually overcome the difficulty. If the stone is deeply encysted, it may be impossible to liberate it. The neck of the cyst may be nicked in several places, efforts made to gnaw off any projecting portions of the stone, and gradually to insinuate the narrow blades of a small curved forceps to extract it. Each case must be coolly studied out at the time; no definite rules, covering all contingencies, can be given."—"Genito-Urinary Diseases with Syphilis." Van Buren and Keyes. 1874.

1b. The Bilateral Operation.

"The bilateral operation of Depuytren, suitable for the extraction of large stones by the perinæum, is performed as follows: The patient is fixed in the ordinary lithotomy position, and the staff, having a median groove, is held centrally. A semi-lunar incision is made crossing the *raphé*, about one inch (from twenty-two to twenty-four millimetres) in front of the anus. The integument, cellular tissue, and interior fibres of the sphincter are cut. The left index-finger

CYSTO-LITHIC.

LITHOTOMY.

Staffs, Directors, Knives and Lithotomes. (Continued.)

FIG. 3124.—Wyeth's Lithotomy Bistoury.



FIG. 3125.—Lateral Lithotomy Staff.



FIG. 3126.—Mason's Catheter Staff.

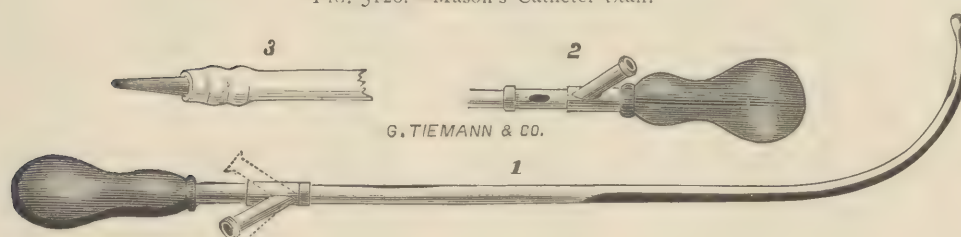


FIG. 3127.—Depuytren's Double Bistoury Caché.

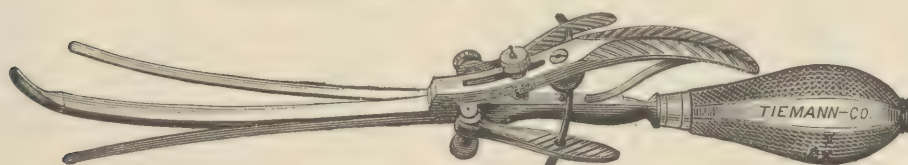


FIG. 3128.—Smith's Lithotome.

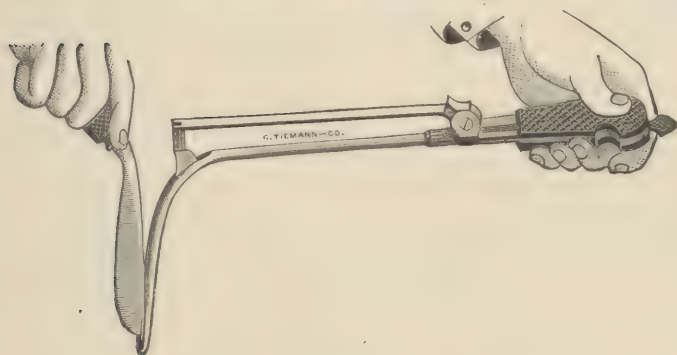


FIG. 3129.—Hutchison's Lithotome.

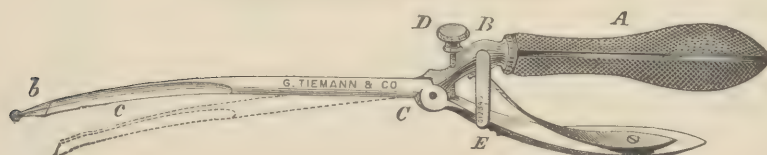
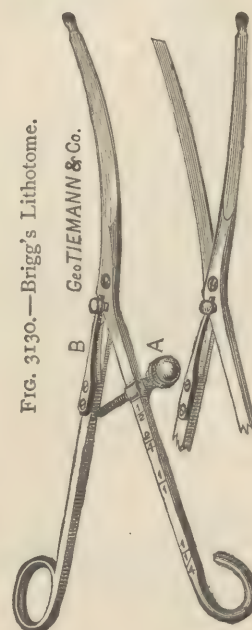


FIG. 3130.—Brigg's Lithotome.



CYSTO-LITHIC.

LITHOTOMY.

1b. The Bilateral Operation. (Continued.)

is now introduced into the wound and made to depress the rectum, while with short strokes of the knife the surgeon endeavors to free those muscular fibres, a part of the sphincter, which hold the bulb of the urethra attached to the anus. The bulb is now turned up and the finger seeks the membranous urethra far back in the wound. This is to be opened upon the nail, the knife being held transversely, to insure safety to the rectum. The operator now takes the double lithotome caché (Fig. 3127), enters its point in the groove of the staff, holding the instrument's convexity upwards. As soon as the lithotome is in the bladder the staff is removed, the blades of the lithotome are protruded, and the instrument is withdrawn, at first horizontally, and then with the handle slightly lowered, so as to spare the rectum. As soon as the prostate has been cut through, the blades are returned to their sheaths and the lithotome is withdrawn.

"The operation of the late James R. Wood, of New York, is essentially a pre-rectal, bilateral operation. After the incision is made across the perinæum in front of the rectum, and the urethra opened, the cutting part of the operation is terminated by placing the button of the bisector (Fig. 3137) in the central groove of the staff (Fig. 3138). This button is so arranged that the bisector cannot escape after its button has once entered the groove. It is pushed directly onwards into the bladder, cutting the prostate and the vesical neck to a moderate extent transversely. Dilatation does the rest. The stone is extracted in the manner described when speaking of the lateral operation."—"Urinary Calculus." By E. L. Keyes, A. M., M. D. "International Cyclopædia of Surgery." Amhurst. Vol. VI. 1886.

2. The Median Operation.

"The median is known classically as the Marian operation, devised in the sixteenth century, and afterwards largely adopted and improved in Italy. Allarton has been its apostle in England, and the modern operation is known by his name. In this country Markoe first brought it into particular prominence, and the names of Little and Walter are also connected with it. Each of these surgeons has enjoyed remarkable success with this operation.

Instruments required.—The only instruments necessary, differing from those employed in the lateral operation, are three: a *staff*, *director* and *knife*. The staff, of appropriate size, has a central groove with a broad flare. Markoe (Fig. 3117) and Little (Fig. 3115) have each adopted a staff. A ball-pointed director, known as Little's (Fig. 3113) is generally employed, and a straight, stout, sharp-pointed *bistoury* (Fig. 3114).

Operation.—The patient bound in the lithotomy position, and the staff introduced in contact with the stone, the operator passes the index-finger of the left hand into the rectum, familiarizes himself with the feel of the parts, and accurately locates the apex of the prostate, just where the staff enters it. He now transfixes the perinæum about half an inch above the anus with the sharp-pointed bistoury, the cutting edge upward, entering the point of the same, guided by the finger in the rectum, into the central groove of the staff, at the apex of the prostate. The double-edged point is now advanced very slightly into the groove, so as certainly to enter the urethra, and barely nick the apex of the prostate. Finally, the knife is made to cut forward and divide the membranous urethra, within, and, the handle being elevated in the vertical plane, the blade is swept so as (theoretically, at least) to avoid the bulb, and cut its way out along the raphé, the external incision being from one and a quarter to one and a half inches long. Thompson prefers making the incision from without centrally inward. The director is now passed along the staff into the bladder, and, these two being separated in an angular way, the neck of the bladder is dilated, some urine flowing out during the process. The staff is now withdrawn, and a finger introduced through the wound, with which the dilatation is completed, without cutting the prostate or the neck of the bladder. The stone—necessarily not very large—is withdrawn, as in lateral lithotomy, and the general after-care of the patient is the same.

"The operation yields excellent results; the patient sometimes retains control over his urine from the first. The wound generally heals rapidly. The objections to the operation are: its general inapplicability except for stones which lithotripsy is more capable of managing, and the temptation to use violence during the extraction of too large a stone. It is eminently applicable for small stones, in a bladder which will not tolerate the use of instruments without chill or other disturbance, for multiple small stones in the adult, and for oldish boys too young for lithotripsy, who by reason of budding and advancing puberty are not very good subjects for the lateral operation. Where rather large stones are extracted by this method, incontinence, sometimes lasting several years, may occasionally ensue. The median operation has been variously modified, as by being combined with single or double prostatic incision, but mainly in relation to the means resorted to to dilate the prostate."—"Genito-Urinary Diseases with Syphilis." Van Buren and Keyes. 1874.

3. The High Operation.

Mode of Performing the High Operation, described by Villeneuve.—All hair is to be shaved from the pubis, the parts are to be washed in an antiseptic solution (carbolic acid 1 in 20, or bichloride of mercury 1 in 1000), and all the details of antiseptic surgery are to be carried out. Anæsthesia is pushed to complete relaxation. A silver catheter with stop-cock is introduced. The bladder is emptied and washed clean with a four per cent. solution of boracic acid. When

CYSTO-LITHIC.

LITHOTOMY.

Staffs, Gorgets, Bisectors, Scoops, Conductors and Forceps.

FIG. 3131.—Dowell's Gorget and Staff.

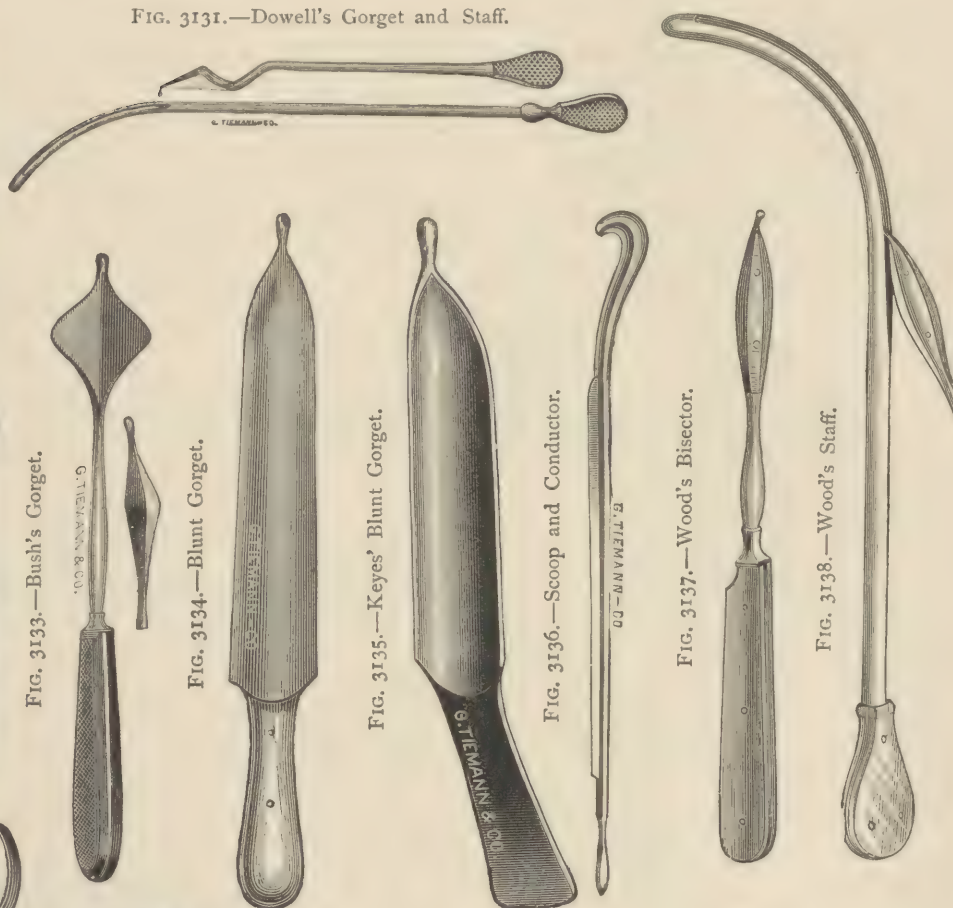


FIG. 3132.—Physick's Gorget (two blades).

FIG. 3133.—Bush's Gorget.

FIG. 3134.—Blunt Gorget.

FIG. 3135.—Keyes' Blunt Gorget.

FIG. 3136.—Scoop and Conductor.

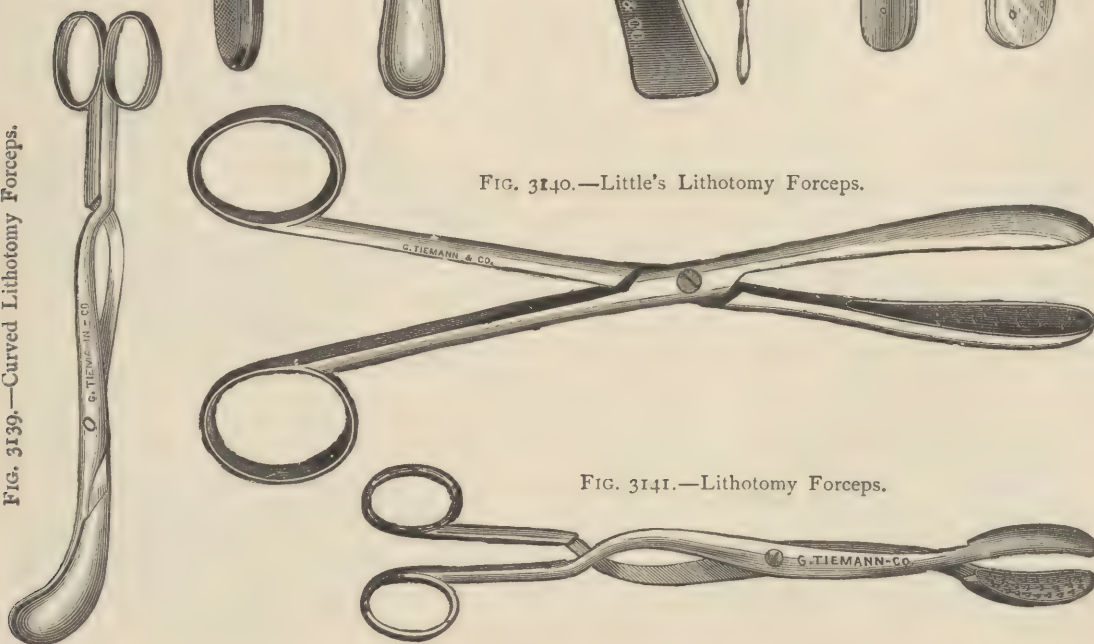
FIG. 3137.—Wood's Bisector.

FIG. 3138.—Wood's Staff.

FIG. 3139.—Curved Lithotomy Forceps.

FIG. 3140.—Little's Lithotomy Forceps.

FIG. 3141.—Lithotomy Forceps.



CYSTO-LITHIC.

LITHOLAPAXY.

3. The High Operation (Continued).

the wash returns clean, the bladder is slowly distended with the same solution and the stopcock turned; meantime the penis has been tied over the silver catheter with a rubber tube, the tension of which is maintained by a forcipressure forceps (Fig. 3148).

"The amount of fluid varies with the receptivity and the degree of irritability and resistance of the bladder. If too much be thrown in, there is danger of rupturing the organ, an accident which has occurred in able hands (Monod, Cheselden, Verneul). Two hundred grammes (between six and seven ounces) is considered a moderate amount, and six hundred grammes the limit. A piston syringe is used, and a guide to the amount to be thrown in is stated to be the resistance offered by the pressure within the bladder to the surgeon's hand as he depresses the piston—a degree of resistance to be learned by experience. It is undoubtedly wiser here to err on the side of safety. Guyon believes that an irritable condition of the bladder, not tolerating distention, contraindicates the operation.

"The rubber ball (Fig. 3147) is next to be greased and inserted into the rectum, and through its tube from twelve to twenty ounces of warm water are to be injected. Six hundred grammes is said to be about the proper amount, but undoubtedly this quantity must vary in different cases. The distention of the rectum brings the bladder plainly into view above the pubis. An incision is now made exactly in the median line, three or four inches long, stopping at the pubic symphysis. The deep fascia is incised upon a director over the entire length of the superficial cut, and the sulcus between the recti muscles is sought. If the pyramidales are in the way, the muscular fibres are to be cut directly through in the middle line. No tearing or pulling asunder is allowable, such separation of the elements of the muscle favoring infiltration. The incision must be as clean as possible.

"After getting through the muscle, a yellow layer of fat is exposed, covered by the transversalis fascia. This thin fascia is seized with forceps in the middle line, near the lower angle of the wound, a button-hole incision is made, and the left forefinger is introduced, bulb upwards. The forefinger thus placed now pushes upwards the yellow layer of fat, carrying before it the perineal cul-de-sac. This is Guyon's manœuvre. He says that by practicing it the peritoneum is never seen. The cellulo-adipose layer, between the bladder and pubis, is not to be disturbed at all, and no effort is made to reach the neck of the bladder low down in front. Such unnecessary burrowing with the finger behind the bone invites infiltration. The finger which has pushed up the fat and the peritoneum is maintained in position in the upper angle, and serves as a guide to the point of the bistoury, which is made to puncture the bladder at this point, and to continue the incision downwards in the middle line from one and a quarter to one and three-quarter inches, according to the size of the calculus. A tenaculum, or the hooked gorget, or any suitable blunt hook, might be used here to hold up the upper angle of the wound in the bladder, or the lips of the wound may be held apart by loops of silk inserted on either side.

"In making the incision into the distended bladder, no attention is to be paid to a plexus of prominent veins which are seen over the front wall of the organ, and which may lie directly in the line of the proposed incision. It tears the tissues to attempt to ligate them. They are to be cleanly cut through. The hæmorrhage, sometimes considerable at first, becomes arrested as the bladder collapses. If no veins are seen, Petersen's manœuvre may be adopted, cutting slowly into the muscular layers of the bladder until the mucous membrane projects through the lips of the vesical wound, then seizing the latter and incising it.

"The liquid having run out, the next step is to untie the penis and remove the catheter. As this is being done, the finger of the surgeon follows the bistoury into the bladder, detects the stone and places it in a position favorable for removal. The forceps follow the finger, seize the stone and extract it slowly and with care not to bruise the sides of the vesical incision. If the latter be too small, it should be enlarged toward the neck of the bladder with a probe-pointed bistoury, as the stone is held in the forceps. All the stones having been extracted, and the débris or clot removed, the bladder is to be carefully washed with the boracic acid solution and the rectal tampon withdrawn.

"Two large parallel tubes of soft red rubber, fenestrated only at their extremity, are now to be introduced upon the finger to the bottom of the bladder near the vesical neck. These tubes must be long enough to mount over the pubes and enter a urinal placed in the bed between the patient's thighs. The tubes are united together by silver wire, passed through their walls, but not into their cavity, and are attached superficially to the lips of the wound by a point of superficial suture on either side.* The wound itself is closed in its upper third, the sutures being passed through the skin, superficial fascia and borders of the recti muscles, without touching the bladder or the peritoneum. A few points of superficial suture are required, and a Lister dressing, or a bichloride or iodoform antiseptic pad is applied, the dressing being performed for the passage of the tubes.

"During the period of after-treatment, the dressing is removed two or three times and reapplied. The tubes are taken out at the end of a week, and intermittent catheterization by the urethra is then resorted to. Drainage by this method is said to be admirable, and the cure is said to be complete by the twentieth day."—"Urinary Calculus." By E. L. Keyes, A. M., M. D. "International Cyclopædia of Surgery." Amhurst. Vol. VI. 1886.

* We make double current tubes, especially adapted for the purpose.—G. T. & Co.

CYSTO-LITHIC.

LITHOTOMY.

The High Operation.

FIG. 3142.—Keith's Tenaculum.



FIG. 3143.—Sonde à Dard.



FIG. 3144.—Helmuth's Sonde à Dard.

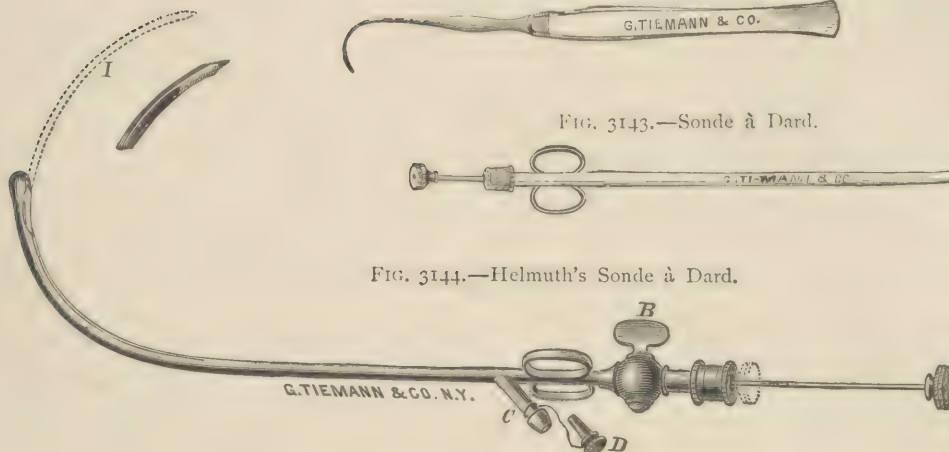


FIG. 3145.—Aponeurotome.

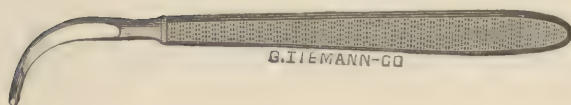


FIG. 3146.—Hooked Gorget.



FIG. 3147.—Peterson's Rectal Colpeurynter, modified by Guyon. For use in the Modern Operation of Supra Pubic Cystotomy (made of thick stiff rubber).

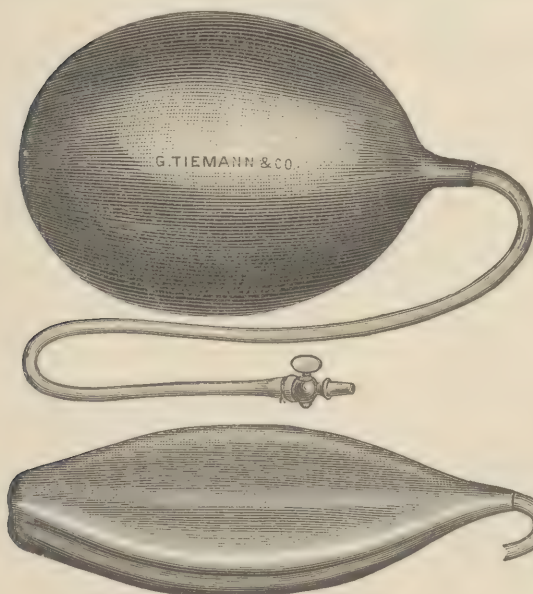
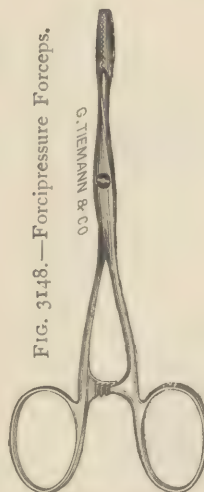


FIG. 3148.—Forcipressure Forceps.



"I am glad to find that Petersen's method of raising the bladder by distending the rectum with an india-rubber bag filled with fluid, as practiced by Sir Henry Thompson, is giving an impulse to the high operation of lithotomy; it has always appeared to me that it is the operation best suited for the removal of large stones, and I have been surprised that it has not been more frequently practised."—Prof. Humphry, in the *London Lancet*. July 25, 1885, page 146.

CYSTO-LITHIC.

PERINEAL LITHOTRITY.

Dolbeau's Operation.

"The name of perineal lithotritry was given, in 1862, by Professor Dolbeau, of Paris, to an operation completed in one sitting, by which the membranous portion of the urethra is opened, the prostate and neck of the bladder dilated instead of being cut (as in lithotomy), and a large stone crushed and the fragments immediately extracted. * * *

"The instruments necessary to perform perineal lithotritry are: a broad, deep and centrally grooved staff; a strong, straight, lancet-pointed bistoury, such as that used in median lithotomy; a six-branched (Dolbeau's) prostatic dilator; three or four lithoclasts of different shapes and strength; two or three pairs of small, straight and curved forceps; a scoop, and a long nozzled rubber syringe. Mr. Dolbeau advises that, in addition to the above-named instruments, the following should be within reach in case unforeseen difficulties should occur during the operation: A beaked bistoury, a single or double lithotome, a blunt gorget, strong forceps, and a canula à chemise.

"*Operation.*—The description Professor Dolbeau gives of his operation is substantially as follows: It comprises three principal steps: 1st. The opening of the bladder; 2d. Lithoclasty, or fragmentation of the stone; 3d. The extraction of the débris.

"1. *Opening of the Bladder.*—The patient, having been properly prepared, is etherized and placed in the lithotomy position. The staff is introduced and confided to the principal assistant, who holds it firmly and perpendicularly in the median line and well hooked under the pubic arch. An incision, two centimetres (about thirteen-sixteenths of an inch) in length, is made in the median raphé, extending to the anal margin and involving the skin and superficial fascia. The deep fascia is next incised; the left index finger-nail is then pressed into the groove of the staff, and the membranous portion of the urethra is punctured with the knife, care being taken to avoid the bulb on one side and the rectum on the other. The urethral incision is only five or six millimetres in length. I see no reason why the knife should not be plunged into the urethra through the skin, as in Allarton's operation.

"*Dilatation.*—In most cases the dilator can be introduced into the bladder at once; but Mr. Dolbeau prefers, for safety's sake, to make dilatation in three steps, the first of which consists in inserting the point of the dilator into the groove of the staff, and fixing it in a direction perpendicular to the plane of the perinæum. The staff is held firmly in position, that there may not be the slightest deviation of either instrument, and that it may serve as a fulcrum for the dilator; and, during dilatation, the assistant should constantly resist the strain arising therefrom. The dilators should be opened very slowly, although during this step scarcely any obstacle is encountered, as the tissues yield readily and the passage is made immediately. Methodical divulsion of the urethra and the crowding back of the tissues from the skin to the urethral rent being thus secured, there is an artificial canal large enough to allow the instrument, after it is closed, to enter the prostatic urethra. Then begins the second step of the dilatation, in which the surgeon, holding in his right hand the dilator, in contact with the groove of the staff, takes the handle of the latter in his left hand and depresses it to an angle of about one hundred and thirty degrees. This depression of the staff causes the point of the dilator to be carried nearer the vesical neck. In this new position of the instruments the perineal wound is again slowly dilated. * * *

"At the termination of the second step, the dilator is closed and the staff removed; but the former is left in position, that the third and last step of dilatation may be accomplished. The dilator may have to be employed two or three times, in order to make the perineal wound sufficiently patent.

"In the third step, also, the introduction of the dilator and its opening must be very slow. Often only its conical extremity can be engaged in the neck of the bladder; when this happens, no violence or haste must be used. It is sufficient to dilate very slowly, then to close the instrument, when it will be comparatively easy to introduce it into the bladder. The dilatation of the vesical neck is then proceeded with, always slowly, stopping each time there is any great resistance. After the dilator is developed to its fullest extent (twenty millimetres), it is gently withdrawn—its six branches remaining open. At the conclusion of the last step of dilatation, Mr. Dolbeau is in the habit of introducing a small straight lithotomy forceps, to ascertain the size and hardness of the stone. If the calculus does not exceed two centimetres in diameter, he extracts it entire, otherwise he proceeds to lithoclasty. In some cases he has been able to reduce to fragments, with this forceps, large phosphatic stones.

"2. *Lithoclasty.*—This step of perineal lithotritry has, according to Mr. Dolbeau, for its principal and essential basis the following proposition: The great danger in the operation of perineal lithotomy is the extraction of a calculus too large, considering the restricted dimensions of the neck of the bladder. Security then resides in fragmentation of the stone. In this manner the fragments extracted are proportioned to the canal by which they pass, and it may be said that, as a rule, calculi which exceed two centimetres should be broken up.

"The manner of breaking up the stone with Mr. Dolbeau's forceps (Fig. 3152) is as follows: After having ascertained the volume of the stone with the small lithotomy forceps, this instrument is removed and the lithoclast, previously oiled, is introduced slowly and cautiously through the artificial canal into the bladder; the stone, if very hard and large, is gnawed by the teeth at the extremity of the lithoclast, so that it is destroyed from the circumference toward the centre, and, when it is sufficiently reduced in size, it is caught between the jaws and broken up, considerable force

CYSTO-LITHIC.

PERINEAL LITHOTRITY.

Dolbeau's Operation (Continued.)

being sometimes required to fracture it. Then fragment after fragment is seized and broken into portions sufficiently small to be extracted without injury to the vesical neck. When the calculus is not very hard and does not exceed an inch in diameter, it may be at once seized and crushed. Mr. Dolbeau was once able to reduce, at one crushing, such a stone to fifty-three fragments, all of which were small enough to be successfully extracted. (Fragmentation with my lithoclasts is done in the same manner.)

"3. *Extraction* is made partly with the lithoclast and small forceps and partly with the scoop. The rules that apply to extraction after lithotomy should here be observed. It is, says Mr. Dolbeau, by a series of fragmentations and explorations followed by extractions that the bladder is finally relieved of the calculous matter. He advises the injection of cold water into the bladder from time to time during the explorations, not for the purpose of washing away calculous debris, which would be impossible, but to control bleeding and to render certain fragments more accessible. He insists that the patient must not be left until it is certain that there is nothing in the bladder, that therefore several explorations should be made with the small forceps through the wound, and also with a metallic sound of short curve introduced by the urethra.

"*The advantages* claimed for the operation are: That the situation of the small wound exposes the patient to very little risk of hæmorrhage; there is less suppuration, and the patient is less exposed to its bad effects, and in fact that it possesses all the advantages of median lithotomy without its disadvantages. Mr. Dolbeau urges that perineal lithotripsy has not been with him an operation of choice, but of necessity; that he has resorted to it only when lithotripsy by the natural route has been contraindicated, and where the larger incision in perineal lithotomy might prove serious."—*"Diseases of the Urinary Organs."* John W. Gouley, M. D., &c.

FIG. 3149.—Dolbeau's Dilator.



FIG. 3150.—Cuyon Duplay's Dilator.

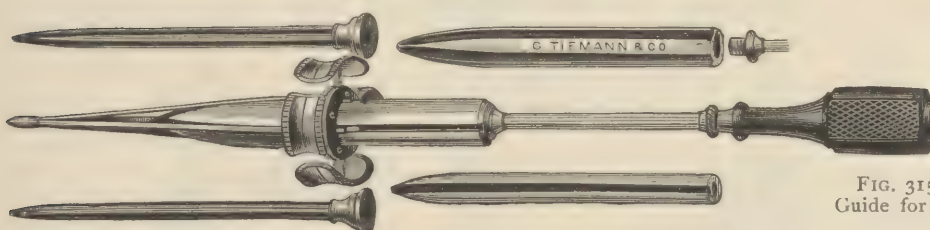


FIG. 3151.—Dolbeau's Guide for the Lithoclast.

Lithoclasts.

FIG. 3152.—Dolbeau's Lithoclast.

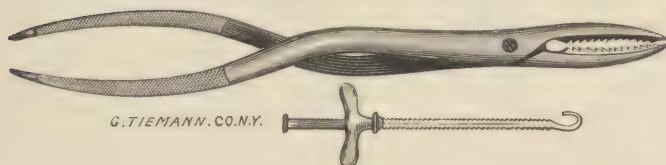
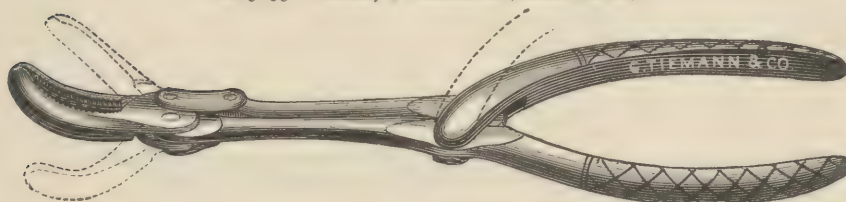


FIG. 3153.—Gouley's Lithoclast (double lever).



CYSTO-LITHIC.

LITHOCLASTY.

Lithoclasts, for Breaking Stones which are found to be too large to extract safely through the wound made in any of the Lithotomies.

FIG. 3154.—Gouley's Lithoclast (plain).

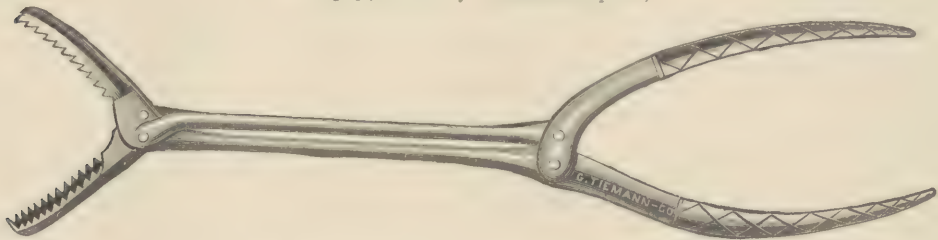
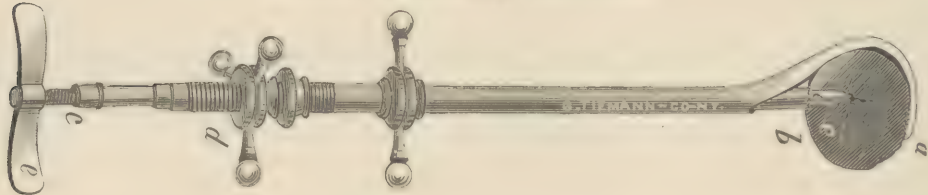
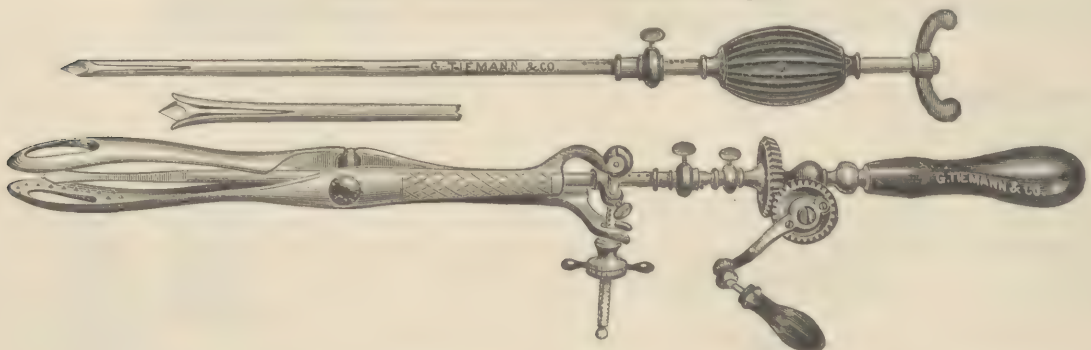


FIG. 3155.—Maisonneuve's Stone Crusher.



The female blade of Maisonneuve's stone crusher terminates in a deep scoop. The scoop, *a*, is introduced carefully through the perineal wound until it has entered the bladder, after which, by a lateral motion, it is insinuated under the large stone. Now the male blade, *c, b*, with its inner shaft, *e, e*, withdrawn, is gradually pushed down against the stone, and screwed firmly by the wheel, *d*, until it holds the calculus fixed. Finally, the inner sharp "bit" at the end of the central shaft, *e*, is, by rotating the handle, driven through the stone, *e*, thus perforating it, and, by the assistance of the wheel, *d*, splitting it into fragments—which may then be removed by the lithotomy forceps.

FIG. 3156.—De Rigal's Stone-Holder, Perforator and Breaker.
(Tennette avec casse-pierre et perforateur de Rigal.)



The forceps or holder is introduced through the wound and the stone fixed between its blades by means of the set-screw. The stone is then perforated, the drill being turned by the crank-gearing. After this the drilling apparatus is withdrawn, and the breaker, shown at the top of figure, passed into the opening by a rotating motion. When in, the winged screw is turned once or twice, this draws the head of the trocar within the slit of the tube, which thus expands and breaks the stone.

FIG. 3157.—Luer's Lithotomy Scoop, for Removing Fragments.



CYSTO-LITHIC.

PERINEAL (SECTION) LITHOTRITY.

FIG. 3158.—Whitehead's Staff and Knife.

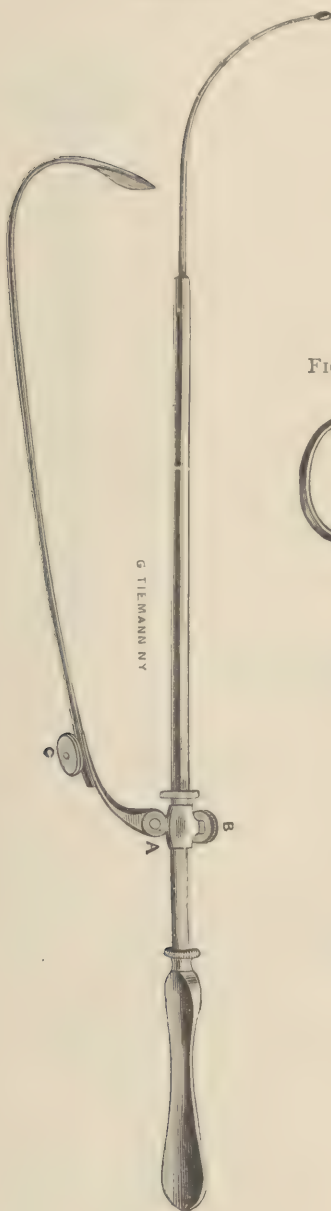


FIG. 3159.—Hewitt's Staff and Knife.



FIG. 3160.—Walker's Prostatic Divulsor.

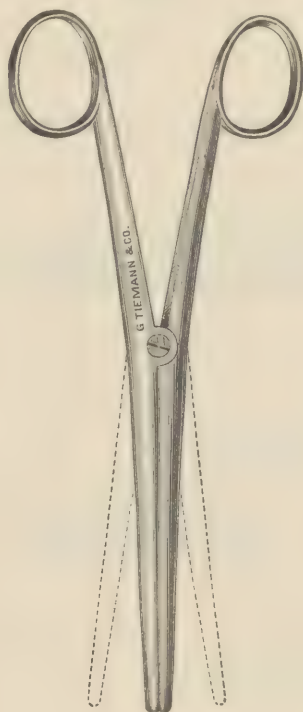
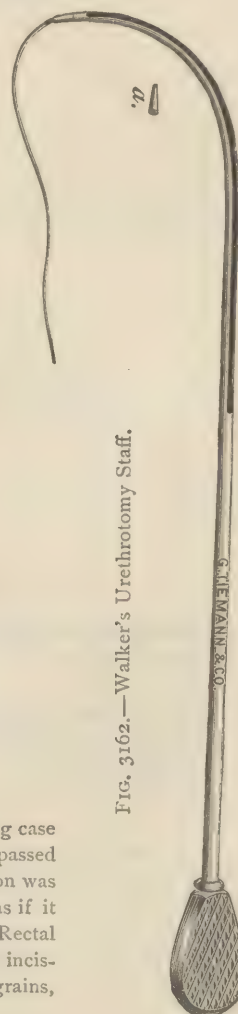


FIG. 3161.—Walker's External Urethrotome.



FIG. 3162.—Walker's Urethrotomy Staff.



Prostatic Calculi.

At a recent meeting of the Surgical Society of Paris, M. Reclus reported the following case (*Revue Medicale*, October 24, 1885). A patient who had just had an attack of renal colic, passed fourteen small stones by the urethra. Upon the introduction of a sound an obstruction was found at the level of the prostate, and as the instrument passed there was a sensation as if it were going over a number of roughened bodies. There was no stone in the bladder. Rectal examination revealed the presence of a hard swelling in the prostatic region. A perineal incision was then made on a guide, and thirty-two calculi, weighing seven hundred and thirty grains, were extracted; two of these were adherent, and were removed with difficulty.

CYSTO-LITHIC.

WASHING OUT DEBRIS, AND ARRESTING HÆMORRHAGE AFTER LITHOTOMY.

FIG. 3163.—Mussey's Bladder Curette.



FIG. 3164.—Van Buren's Débris Syringe.

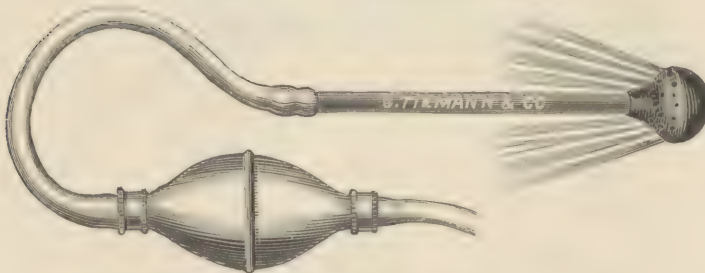
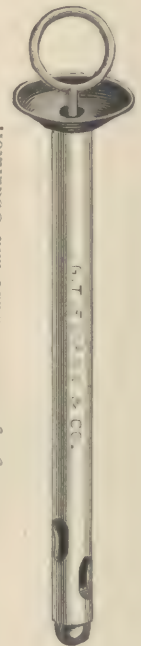


FIG. 3165.—Débris Tube and Obturator.



For Arresting Hæmorrhage after Lithotomy.

FIG. 3166.—Gouley's Hydro-Hæmostat.

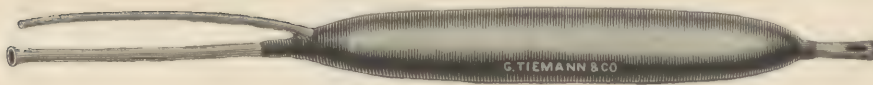


FIG. 3167.—Campbell's Canula, with Cotton Introducer.



FIG. 3168.—Brown's Air Tampon, for Hæmorrhage.

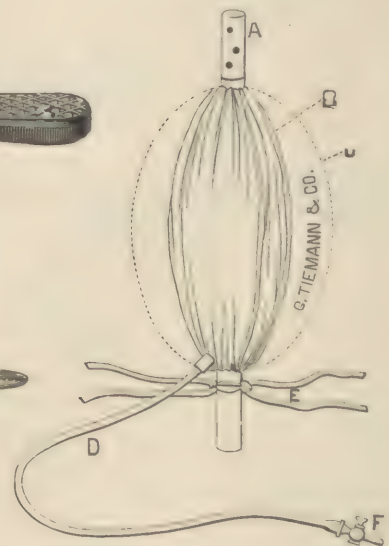
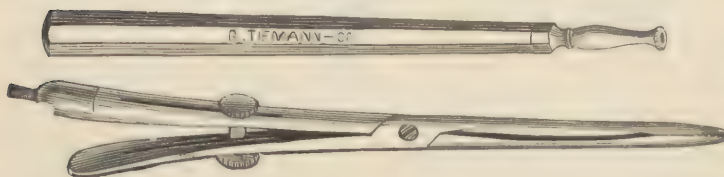


FIG. 3169.—Gross' Artery Compressor.



"The hæmorrhage after perineal lithotomy is usually very slight, not exceeding two or three ounces. It may be arterial or venous, primary or secondary. Its principal sources are the artery of the bulb and the superficial artery of the perinæum. In old subjects a copious flow of blood occasionally proceeds from the veins of the neck of the bladder and of the prostate gland. The pudic artery, in its natural course, can hardly be wounded posteriorly; anteriorly, however, it is more exposed, and, therefore, in danger of being injured. The accident is most likely to happen when the prostate is divided with the gorget or the

CYSTO-LITHIC.

FOR ARRESTING HÆMORRHAGE AFTER LITHOTOMY. (Continued.)

FIG. 3170.
Canula à Chemise.



lithotome caché. The artery of the bulb sometimes bleeds profusely; and from its deep position, and the readiness with which it reacts, is always secured with difficulty. A tremendous gush of blood sometimes proceeds from the transverse perineal artery. The bleeding generally follows the first incision, and should immediately be arrested with the ligature. When the artery is situated very far back, at the neck of the bladder, or by the side of the prostate gland, it may be extremely difficult, if not impossible, to ligate it. To meet this contingency I devised a pair of forceps (Fig. 3169) which, after having grasped the artery, may be permanently retained, by unscrewing its handle, until all danger from hæmorrhage is over.

"Compression may be resorted to when it is impossible to use the ligature or torsion. A canula (Fig. 3170) consisting of metal or hard rubber, four inches and a half long by four lines in diameter, open at the vesical extremity, or provided with large eyelets and surrounded with a chemise, is inserted into the bladder, previously emptied of clots, when the chemise is tightly plugged with charpie, tow or cotton. The instrument is then secured by means of pieces of tape to a double T bandage, and answers the twofold purpose of conducting off urine and compressing the bleeding vessels. It should be retained for several days, or until there is reason to believe that all danger of hæmorrhage is over. Professor Campbell, of Georgia, prefers a slightly curved to a straight canula (Fig. 3167)."—"System of Surgery." Gross.

Renal Lithotomy, or Nephrotomy, and Nephrectomy.

"The number of cases in which surgeon's have cut into the kidneys, or have taken out the kidney, is now very considerable, while a few years ago the operation was a rarity. The kidney is subject to many incurable diseases, and especially to the formation of stone in its substance. Such a stone can be reached in no way except by the knife. An incision is made through the loin down to the diseased organ, and it is laid open. If the disease be calculus, this may be removed and the kidney left in its place; or, if the kidney be found extensively diseased, it may itself be removed."—"Appleton's Annual Cyclopædia." 1883.

"Jane J., age 42, married, was the mother of ten children. On July 2d, 1884, a fortnight after my first visit, I had her placed under ether by my son, and, assisted by Mr. Thompson and Mr. Freshney, performed the following operation under full antiseptic precautions. I made an incision parallel with the last rib, as for lumbar colotomy, and, on arriving at the peritoneum, which was easily pushed aside, I could feel the lower and outer convex border of the kidney. I then passed a very fine aspirating needle into it. At the first insertion no stone was felt, nor did anything come into the cylinder of the aspirator. I made a second insertion, somewhat more upwards, when I struck the stone, and the cylinder filled with pus. I then carefully cut down on the needle, using it as a director, following the knife with my finger, and making the wound in the kidney large enough to introduce two fingers; after which there was not much difficulty, with the aid of a lithotomy scoop, in removing a large branched stone, in shape rather like a piece of ginger-root. It is composed of the triple phosphates, and weighs three drachms and fourteen grains. There was only one small vessel which required tying; and during the operation there was a slight oozing from the kidney, which soon ceased. After removal of the stone I thoroughly explored the dilated kidney, both with my fingers and with a pair of curved forceps. A small stone, weighing six grains, was the result (this stone had a facet on it). There were eight ounces of foetid pus emptied out; before closing the wound, we thoroughly sponged it out.

"I requested Mr. Thompson to examine the interior of the dilated kidney and, then, inserting a large drainage-tube, stitched the outer wound with silver sutures, and dressed with a pad of salicylic silk. The patient rallied very well, and the same evening the thermometer went down to 99, and only once rose higher. She gradually progressed toward convalescence, the pus slowly decreasing. Then again, during four months, she passed a rather large number of small calculi, the size of peas, and they were accompanied with a small quantity of pus. She has had no more hæmaturia, and is gradually gaining flesh; the wound is entirely healed, only a small fistulous opening remaining, which requires a pad of lint once or twice a week." * * *

"Nephrectomy for other causes has been performed successfully on individuals as old as fifty-three."—R. H. Bouchier Nicholson, M. R. C. S., Assistant Surgeon to the Royal Infirmary, Hull, Eng., in *British Medical Journal*, Sept. 5, 1885.

GYNÆCOLOGICAL.

FEMALE ORGANS OF GENERATION.

External.

"The external organs of generation in the female are the mons veneris, the labia majora and minora, the clitoris, the meatus urinarius, and the orifice of the vagina. The term "vulva" or "pudendum," as generally applied, includes all these parts.

"The *mons veneris* is the rounded eminence in front of the pubes, formed by a collection of fatty tissue beneath the integument. It surmounts the vulva, and is covered with hair at the time of puberty.

"The *labia majora* are two prominent longitudinal cutaneous folds, extending downwards from the mons veneris to the anterior boundary of the perinæum, and enclosing an elliptical fissure, the common urino-sexual opening. Each labium is formed externally of integument covered with hair; internally, of mucous membrane, which is continuous with the genito-urinary mucous tract; and, between the two, of a considerable quantity of areolar tissue, fat and a tissue resembling the dartos of the scrotum, besides vessels, nerves and glands. The labia are thicker in front than behind, and joined together at each extremity, forming the anterior and posterior commissures. The interval left between the posterior commissure and the margin of the anus is about an inch in length, and constitutes the perinæum. Just within the posterior commissure is a small transverse fold, the *frænulum pudendi*, or *fourchette*, which is commonly ruptured in the first parturition, and the space between it and the commissure is called the *fossa navicularis*. The labia are analogous to the scrotum in the male.

"The *labia minora*, or *nymphæ*, are two small folds of mucous membrane situated within the labia majora, extending from the clitoris obliquely downwards and outwards for about an inch and a half on each side of the orifice of the vagina, on the sides of which they are lost. They are continuous externally with the labia majora, internally with the inner surface of the vagina. As they converge towards the clitoris in front, each labium divides into two folds, which surround the glans clitoridis, the superior folds uniting to form the *præputium clitoridis*, the inferior folds being attached to the glans, and forming the *frænum*. The nymphæ are composed of mucous membrane, covered by a thin epithelial layer. They contain a plexus of vessels in their interior, and are provided with numerous large mucous crypts, which secrete abundance of sebaceous matter.

"The *clitoris* is an erectile structure, analogous to the corpora cavernosa of the penis. It is situated beneath the anterior commissure, partially hidden between the anterior extremities of the labia minora. It is an elongated organ, connected to the rami of the pubes and ischia on each side by two crura; the body is short and concealed beneath the labia; the free extremity, or glans clitoridis, is a small rounded tubercle, consisting of spongy erectile tissue, and highly sensitive. The clitoris consists of two corpora cavernosa, composed of erectile tissue enclosed in a dense layer of fibrous membrane, united together along their inner surfaces by an incomplete fibrous pectiniform septum. It is provided, like the penis, with a suspensory ligament, and with two small muscles, the *erectores clitoridis*, which are inserted into the crura of the corpora cavernosa. Between the clitoris and the entrance of the vagina is a triangular smooth surface, bounded on each side by the nymphæ: this is the *vestibule*.

"The orifice of the urethra (*meatus urinarius*) is situated at the back part of the vestibule, about an inch below the clitoris, and near the margin of the vagina, surrounded by a prominent elevation of the mucous membrane. Below the meatus urinarius is the orifice of the vagina, an elliptical aperture, more or less closed in the virgin by a membranous fold—the hymen. The *hymen* is a thin semilunar fold of mucous membrane, stretched across the lower part of the orifice of the vagina; its concave margin being turned upwards towards the pubes. Sometimes this membrane forms a complete septum across the orifice of the vagina; a condition known as imperforate hymen. Occasionally it forms a circular septum, perforated in the centre by a round opening; sometimes it is cribriform, or its free margin forms a membranous fringe, or it may be entirely absent. It may also persist after copulation. The hymen cannot, consequently, be considered as a test of virginity. Its rupture, or the rudimentary condition of the membrane above referred to, gives rise to those small rounded elevations which surround the opening of the vagina, the *carunculæ mirtiiformes*.

"*Glands of Bartholine*.—On each side of the commencement of the vagina is a round or oblong body, of a reddish-yellow color, and of the size of a horse-bean, analogous to Cowper's gland in the male. It is called the *gland of Bartholine*. Each gland opens by means of a long single duct, upon the inner side of the nymphæ, external to the hymen. Extending from the clitoris, along either side of the vestibule, and lying a little behind the nymphæ, are two large oblong masses, about an inch in length, consisting of a plexus of veins inclosed in a thin layer of fibrous membrane. These bodies are narrow in front, rounded below, and are connected with the crura of the clitoris and rami of the pubes; they are termed by Kobelt the *bulbi vestibuli*, and he considers them analogous to the bulb of the corpus spongiosum in the male. Immediately in front of these bodies is a smaller venous plexus, continuous with the bulbi vestibuli behind and the glans clitoridis in front; it is called by Kobelt the *pars intermedia*, and is considered by him as analogous to that part of the corpus spongiosum which immediately succeeds the bulb.

Bladder.

"The bladder is situated at the anterior part of the pelvis. It is in relation, *in front*, with the os pubis; *behind*, with the uterus—some convolutions of the small intestine being interposed; its *base* lies in contact with the neck of the

GYNÆCOLOGICAL.

SPECULA VAGINÆ.

For Facilitating Inspection, Exploration, Applications and Operations.

FIG. 3171.—Ferguson's Tubular Speculum.



FIG. 3172.
Dome Top Speculum.



FIG. 3173.
Thomas' Telescopic
Speculum.



FIG. 3174.—Ferguson's Mirror Speculum.

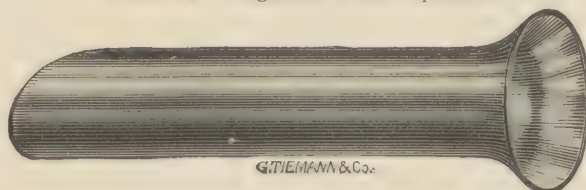


FIG. 3175.—Ashton's Fenestrated Speculum.



FIG. 3176.—Thomas' Tubular Speculum.

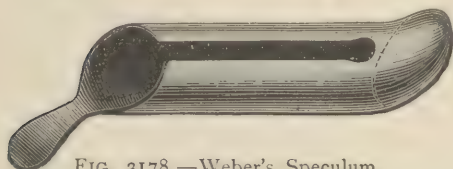


FIG. 3177.—Bivalve Vaginal Speculum.

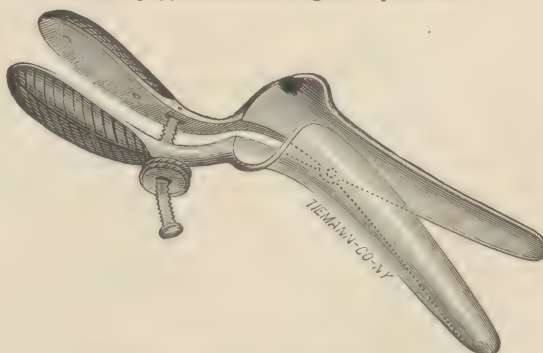


FIG. 3178.—Weber's Speculum.

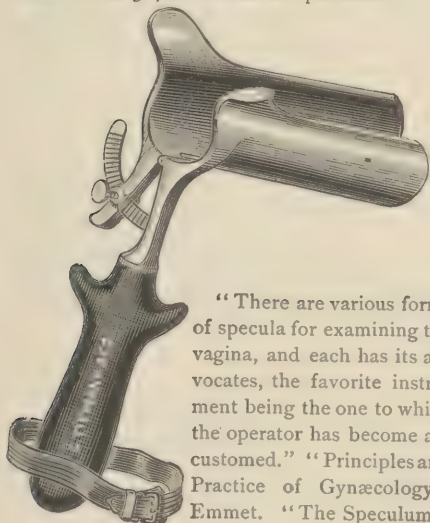


FIG. 3179.—Segala's Speculum.



"There are various forms of specula for examining the vagina, and each has its advocates, the favorite instrument being the one to which the operator has become accustomed." "Principles and Practice of Gynæcology." Emmet. "The Speculum."

GYNÆCOLOGICAL.

FEMALE ORGANS OF GENERATION.

Bladder. (Continued.)

uterus, and with the anterior wall of the vagina. The bladder is said to be larger in the female than in the male, and is very broad in its transverse diameter.

Urethra.

"The urethra is a narrow membranous canal, about an inch and a half in length, extending from the neck of the bladder to the meatus urinarius. It is placed beneath the symphysis pubis, embedded in the anterior wall of the vagina; and its direction is obliquely downwards and forwards, its course being slightly curved, the concavity directed forwards and upwards. Its diameter, when undilated, is about a quarter of an inch. The urethra perforates the triangular ligament precisely as in the male, and is surrounded by the muscular fibres of the compressor urethræ.

"*Structure*.—The urethra consists of three coats: muscular, erectile and mucous. The *muscular coat* is continuous with that of the bladder; it extends the whole length of the tube, and consists of a thick stratum of circular fibres. A thin layer of spongy, *erectile* tissue, intermixed with much elastic tissue, lies immediately beneath the mucous coat. The *mucous coat* is pale, continuous, externally, with that of the vulva, and internally with that of the bladder. It is thrown into longitudinal folds, one of which, placed along the floor of the canal, resembles the verumontanum in the male urethra. It is lined by laminated epithelium, which becomes spheroidal at the bladder. Its external orifice is surrounded by a few mucous follicles. The urethra, from not being surrounded by dense resisting structures, as in the male, admits of considerable dilatation, which often enables the surgeon to remove calculi, or other foreign bodies, from the cavity of the bladder.

Rectum.

"The rectum is more capacious and less curved in the female than in the male.

"The *first portion* extends from the left sacro-iliac symphysis to the middle of the sacrum. Its connections are similar to those in the male.

"The *second portion* extends to the tip of the coccyx. It is covered in front by the peritoneum, but only for a short distance, at its upper part: it is in relation with the posterior wall of the vagina.

"The *third portion* curves backwards from the vagina to the anus, leaving a space which corresponds on the surface of the body to the perinæum. Its extremity is surrounded by the sphincter muscles, and its sides are supported by the levatores ani.

The Vagina.

"The vagina is a membranous canal, extending from the vulva to the uterus. It is situated in the cavity of the pelvis, behind the bladder, and in front of the rectum. Its direction is curved forwards and downwards, following at first the line of the axis of the cavity of the pelvis, and afterwards that of the outlet. It is cylindrical in shape, flattened from before backwards, and its walls are ordinarily in contact with each other. Its length is about four inches along its anterior wall, and between five and six inches along its posterior wall. It is constricted at its commencement and becomes dilated near its uterine extremity; it surrounds the vaginal portion of the cervix uteri, a short distance from the os, and its attachment extends higher up on the posterior than on the anterior wall of the uterus.

"*Relations*.—Its *anterior surface* is concave, and in relation with the base of the bladder and with the urethra. Its *posterior surface* is convex and connected to the anterior wall of the rectum, for the lower three-fourths of its extent, the upper fourth being separated from that tube by the recto-uterine fold of peritoneum, which forms a *cul-de-sac* between the vagina and rectum. Its sides give attachment superiorly to the broad ligaments, and inferiorly to the levatores ani muscles and recto-vesical fascia.

"*Structure*.—The vagina consists of an external, or muscular coat, a layer of erectile tissue, and an internal mucous lining.

"The *muscular coat* consists of longitudinal fibres, which surround the vagina, and are continuous with the superficial muscular fibres of the uterus. The strongest fasciculi are those attached to the recto-vesical fascia on each side.

"The *erectile tissue* is inclosed between two layers of fibrous membrane; it is more abundant at the lower than at the upper part of the vagina.

"The *mucous membrane* is continuous, above, with that lining of the uterus, and below with the integument covering the labia majora. Its inner surface presents, along the anterior and posterior walls, a longitudinal ridge, or raphé, called the *columns of the vagina*, and numerous transverse ridges, or rugæ, extending outwards from the raphé, on each side. These rugæ are most distinct near the orifice of the vagina, especially in females before parturition. They indicate its adaptation for dilatation, and are calculated to facilitate its enlargement during parturition. The mucous membrane is covered with conical and filiform papillæ, and provided with mucous glands and follicles, which are especially numerous in its upper part and around the cervix uteri. The epithelium is of the squamous variety.

GYNÆCOLOGICAL.

SPECULA VAGINÆ.

For Facilitating Inspection, Exploration, Applications and Operations.

FIG. 3180.—Labia Speculum.

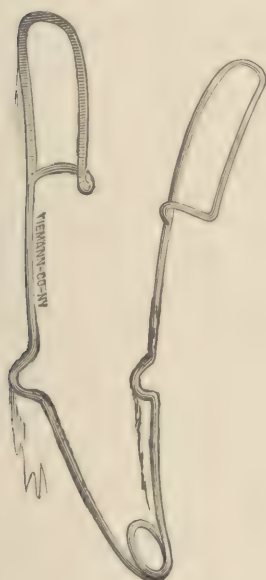


FIG. 3181.—French's Speculum.

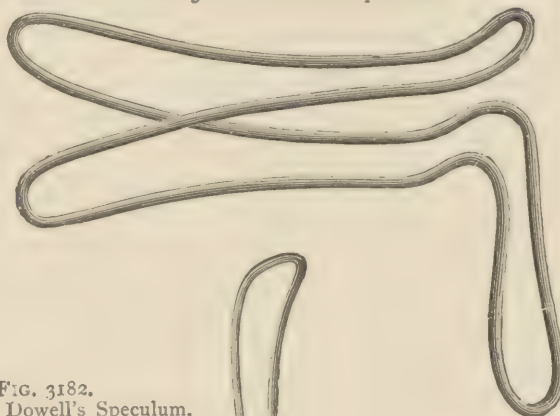


FIG. 3182.
Greenville Dowell's Speculum.

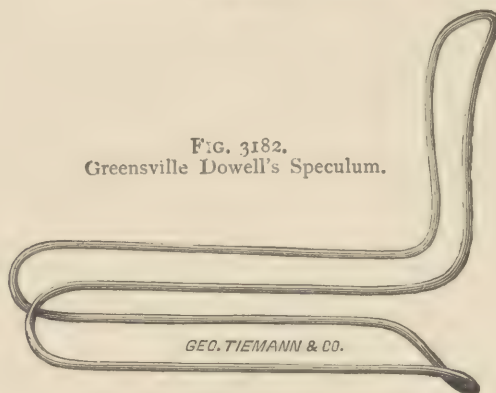


FIG. 3183.—Blakeley's Resilient Speculum.

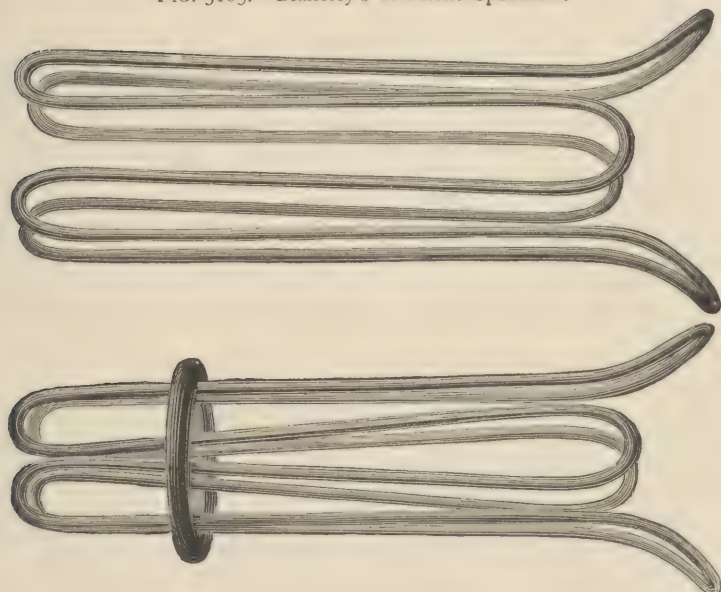


FIG. 3184.—Bath Speculum.



"There is one property, in a high degree characteristic of the instruments employed in the investigation of the diseases of women, of such singular value that it ought to completely silence the objections at one time so passionately urged against them. It is this: the instruments have therapeutical as well as a diagnostic application; the speculum, for instance, revealing a lesion of the cervix uteri, enables the surgeon at once to apply his remedy. Thus treatment follows upon the track of diagnosis, one sitting and one operation serving for both."—Barnes, "On Diseases of Women."

GYNÆCOLOGICAL.

FEMALE ORGANS OF GENERATION. (Continued.)

The Uterus.

"The uterus is the organ of gestation, receiving the fecundated ovum in its cavity, retaining and supporting it during the development of the foetus, and becoming the principal agent in its expulsion at the time of parturition. *In the virgin state* it is pear-shaped, flattened from before backwards, and situated in the cavity of the pelvis, between the bladder and the rectum; it is retained in position by the round and broad ligaments on each side, and projects into the upper end of the vagina below. Its upper end, or base, is directed upwards and forwards; its lower end, or apex, downwards and backwards, in the line of the axis of the inlet of the pelvis. It, therefore, forms an angle with the vagina, since the direction of the vagina corresponds to the axis of the cavity and outlet of the pelvis. The uterus measures about three inches in length, two in breadth at its upper part, and an inch in thickness, and it weighs from an ounce to an ounce and a half.

"The *fundus* is the upper broad extremity of the organ; it is convex, covered by peritoneum, and placed on a line below the level of the brim of the pelvis.

"The *body* gradually narrows from the fundus to the neck. Its *anterior surface* is flattened, covered by peritoneum in the upper three-fourths of its extent, and separated from the bladder by some convolutions of the small intestine; the lower fourth is connected with the bladder. Its *posterior surface* is convex, covered by peritoneum throughout, and separated from the rectum by some convolutions of the intestine. Its *lateral margins* are concave, and give attachment to the Fallopian tube above, the round ligament below and in front of this, and the ligament of the ovary behind and below both of these structures.

"The *cervix* is the lower rounded and constricted portion of the uterus; around its circumference is attached the upper part of the vagina, which extends upwards a greater distance behind than in front.

"At the vaginal extremity of the uterus is a transverse aperture, the *os uteri*, bounded by two lips, the anterior of which is thick, the posterior narrow and long.

"*Ligaments.*—The ligaments of the uterus are six in number: two anterior, two posterior, and two lateral. They are formed of peritoneum.

"The *two anterior ligaments* (vesico-uterine) are two semilunar folds, which pass between the neck of the uterus and the posterior surface of the bladder.

"The *two posterior ligaments* (recto-uterine) pass between the sides of the uterus and rectum.

"The *two lateral or broad ligaments* pass from the sides of the uterus to the lateral walls of the pelvis, forming a septum across the pelvis, which divides that cavity into two portions. In the anterior part are contained the bladder, urethra and vagina; in the posterior part the rectum.

"The *cavity of the uterus* is small in comparison with the size of the organ: that portion of the cavity which corresponds to the body is triangular, flattened from before backwards, so that its walls are closely approximated, and having its base directed upwards towards the fundus. At each superior angle is a funnel-shaped cavity, which constitutes the remains of the division of the body of the uterus into two cornua; and at the bottom of each cavity is the minute orifice of the Fallopian tube. At the inferior angle of the uterine cavity is a small constricted opening, the internal orifice (*ostium internum*), which leads into the cavity of the cervix. The cavity of the cervix is somewhat cylindrical, flattened from before backwards, broader at the middle than at either extremity, and communicates, below, with the vagina. Each wall of the canal presents a longitudinal column, from which proceed a number of small oblique columns, giving the appearance of branches from the stem of a tree, and hence the name *arbor vitæ uterinus* applied to it. These folds usually become very indistinct after the first labor.

"*Structure.*—The uterus is composed of three coats: an external serous coat, a middle or muscular layer, and an internal mucous coat.

"The *serous coat* is derived from the peritoneum; it invests the fundus and the whole of the posterior surface of the body of the uterus, but only the upper three-fourths of its anterior surface.

"The *muscular coat* forms the chief bulk of the substance of the uterus. In the unimpregnated state it is dense, firm, of a grayish color, and cuts almost like cartilage. It is thick opposite the middle of the body and fundus, and thin at the orifice of the Fallopian tubes. It consists of bundles of unstriped muscular fibres, disposed in layers, intermixed with areolar tissue, bloodvessels, lymphatic vessels and nerves. In the impregnated state, the muscular tissue becomes more prominently developed, and is disposed in three layers: external, middle and internal. The external layer is placed beneath the peritoneum, disposed as a thin plane on the anterior and posterior surfaces. It consists of fibres, which pass transversely across the fundus, and, converging at each superior angle of the uterus, are continued on the Fallopian tubes, the round ligament and ligament of the ovary—some passing at each side into the broad ligament and others running backwards from the cervix into the recto-uterine ligaments. The middle layer of fibres presents no regularity in its arrangement, being disposed longitudinally, obliquely and transversely. The internal, or deep layer, consists of circular fibres arranged in the form of two hollow cones, the apices of which surround the orifices of the Fallopian tubes, their bases intermingling with one another on the middle of the body of the uterus. At the cervix these fibres are disposed transversely.

GYNÆCOLOGICAL.

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FIG. 3185.—Ball's Speculum.

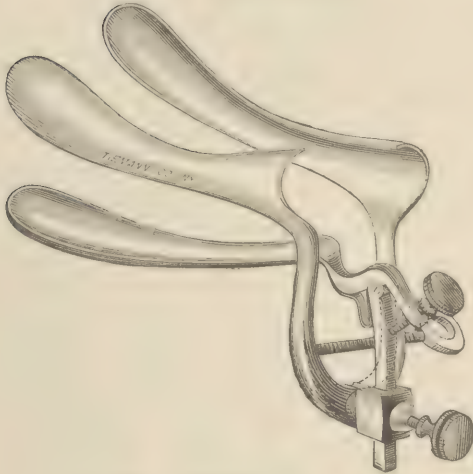


FIG. 3186.—Meadow's Trivalve Speculum.

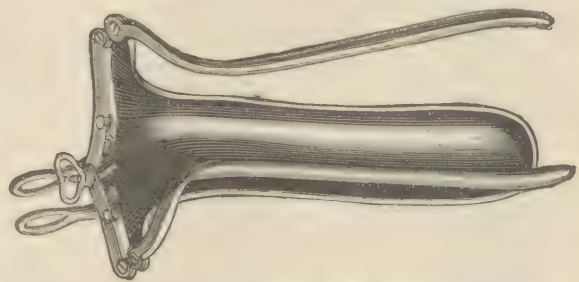


FIG. 3187.—Weiss' Speculum.

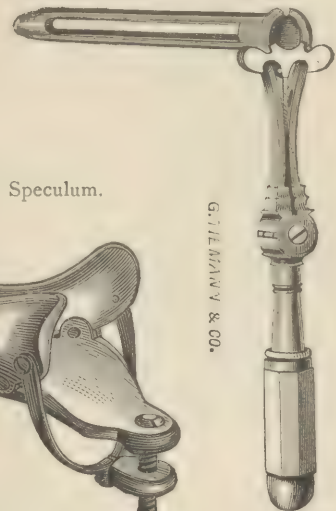


FIG. 3188.—Tiemann's & Co.'s Trivalve Steel Speculum.

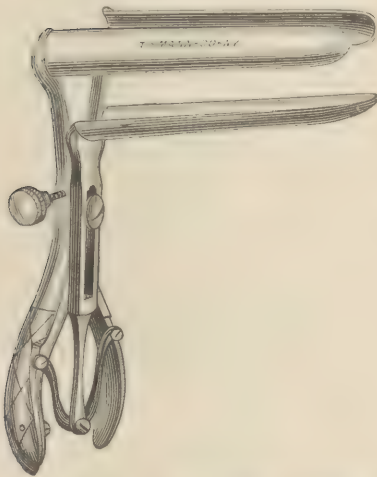


FIG. 3189.—Stohlmann's Speculum.

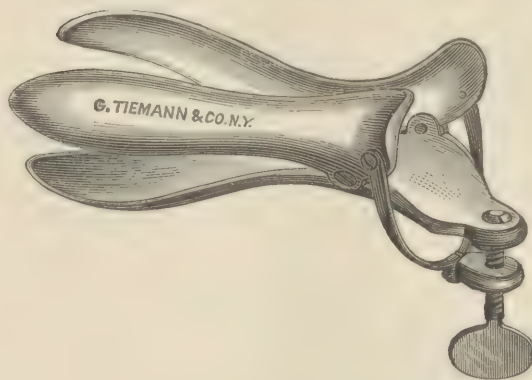


FIG. 3191.—Nelson's Speculum Vaginæ.

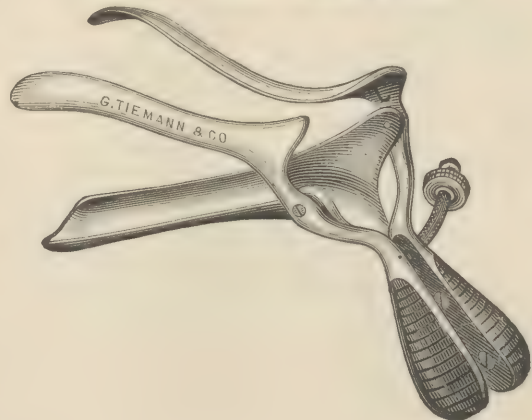
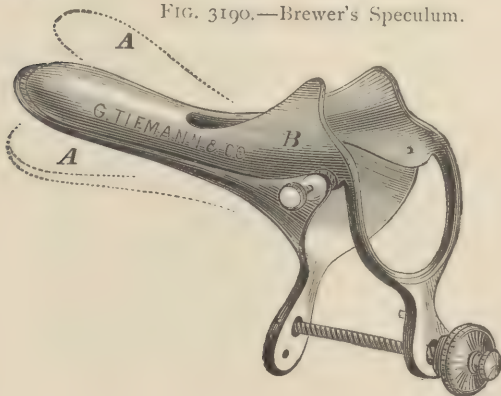


FIG. 3190.—Brewer's Speculum.



GYNÆCOLOGICAL.

FEMALE ORGANS OF GENERATION.

The Uterus. (Continued.)

"The *mucous membrane* is thin, smooth, soft, of a reddish color, lined by columnar-ciliated epithelium, and presents, when viewed with a lens, the orifices of numerous tubular follicles arranged perpendicularly to the surface. They are of small size in the unimpregnated uterus, but shortly after impregnation they are enlarged, elongated, presenting a contorted or waved appearance towards their closed extremities, which occasionally dilate into two or three sacculated extremities. The circular orifices of these glands may be seen on the inner surface of the mucous membrane, many of which during the early period of pregnancy are surrounded by a whitish ring, formed of epithelium which lines the follicles. In the impregnated uterus the epithelium loses its ciliated character. In the cervix the mucous membrane, between the rugæ and around the os uteri, is provided with numerous mucous follicles and glands. The small, transparent, vesicular elevations, so often found with the os and cervix uteri, are due to closure of the mouths of these follicles, and their distention with their proper secretion. They are called the *ovula of Naboth*. The mucous membrane covering the lower half of the cervix presents numerous papillæ.

"*Vessels and nerves*.—The arteries of the uterus are the uterine, from the internal iliac; and the ovarian, from the aorta. They are remarkable for their tortuous course in the substance of the organ, and for their frequent anastomoses.

"The *veins* are of large size and correspond with the arteries. In the impregnated uterus these vessels are termed *uterine sinuses*, consisting of the lining membrane of the veins adhering to the walls of canals channelled through the substance of the uterus. They terminate in the uterine plexuses. The *lymphatics* are of large size in the impregnated uterus, and terminate in the pelvic and lumbar glands. The *nerves* are derived from the inferior hypogastric and spermatic plexuses, and from the third and fourth sacral nerves.

"The form, size and situation of the uterus vary at different periods of life and under different circumstances: *In the fœtus* the uterus is contained in the abdominal cavity, projecting beyond the brim of the pelvis. The cervix is considerably larger than the body. *At puberty* the uterus is pyriform in shape, and weighs from eight to ten drachms. It has descended into the pelvis, the fundus being just below the level of the brim of this cavity. The *arbor vitæ* is distinct, and extends to the upper part of the cavity of the organ. *During and after menstruation* the organ is enlarged and more vascular, its surfaces rounder; the os externum is rounded, its labia swollen, and the lining membrane of the body thickened, softer and of a darker color. *During pregnancy* the uterus increases as to weight from one pound and a half to three pounds. It becomes enormously enlarged, and projects into the hypogastric and lower part of the umbilical regions. This enlargement, which continues up to the sixth month of gestation, is partially due to increased development of pre-existing and new-formed muscular tissue. The round ligaments are enlarged, and the broad ligaments become encroached upon by the uterus making its way between their laminae. The mucous membrane becomes more vascular, its mucous follicles and glands enlarged; the rugæ and folds in the canal of the cervix become obliterated; the blood and lymphatic vessels, as well as the nerves, according to the researches of Dr. Lee, greatly enlarged. *After parturition* the uterus nearly regains its usual size, weighing from two to three ounces; but the cavity is larger than in the virgin state; the external orifice is more marked and assumes a transverse direction; its edges present a fissured surface; its vessels are tortuous, and its muscular layers are more defined. *In old age* the uterus becomes atrophied, and paler and denser in texture; a more distant constriction separates the body and cervix. The ostium internum and, occasionally, the vaginal orifice, often become obliterated, and its labia almost entirely disappear.

Appendages of the Uterus.

"The appendages of the uterus are: the Fallopian tubes, the ovaries and their ligaments. These structures, together with their nutrient vessels and nerves, and some scattered muscular fibres, are inclosed between the two folds of peritoneum, which constitute the broad ligament; they are placed in the following order: in front is the broad ligament; the Fallopian tube occupies the free margin of the broad ligament; the ovary and its ligament are behind and below the latter.

"The *Fallopian tubes*, or oviducts, convey the ova from the ovaries to the cavity of the uterus. They are two in number, one on each side, situated in the free margin of the broad ligament, extending from each superior angle of the uterus to the sides of the pelvis. Each tube is about four inches in length; its canal is exceedingly minute, and commences at the superior angle of the uterus by a minute orifice, the *ostium internum*, which will hardly admit a fine bristle; it continues narrow along the inner half of the tube, and then gradually widens into a trumpet-shaped extremity, which becomes contracted at its termination. This orifice is called the *ostium abdominale*, and communicates with the peritoneal cavity. Its margins are surrounded by a series of fringe-like processes, termed *fimbriae*, and one of these processes is connected with the outer end of the ovary. To this part of the tube the name *fimbriated extremity* is applied; it is also called *morsus diaboli*, from the peculiar manner in which it embraces the surface of the ovary during sexual excitement. In connection with the fimbriae of the Fallopian tube, or with the broad ligament close to them, there is frequently a small vesicle, or *hydatid*, floating on a long stalk of peritoneum.

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FIG. 3192.—Tiemann & Co.'s Quatrivalve Speculum.

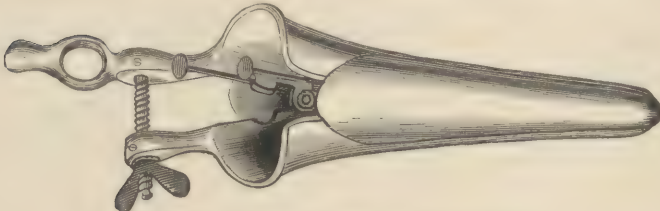


FIG. 3193. Schlotterbeck's Speculum.



Pat. Feb. 24, 1874.

FIG. 3194.—Meadow's Quatrivalve Speculum.
Open. Closed.

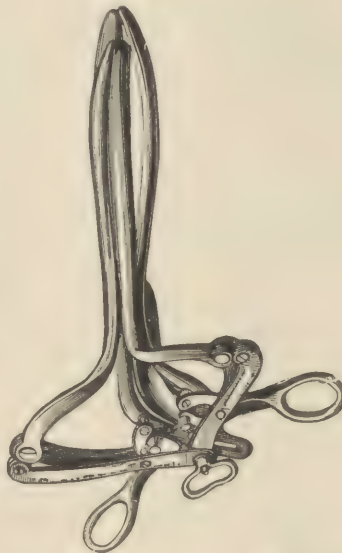
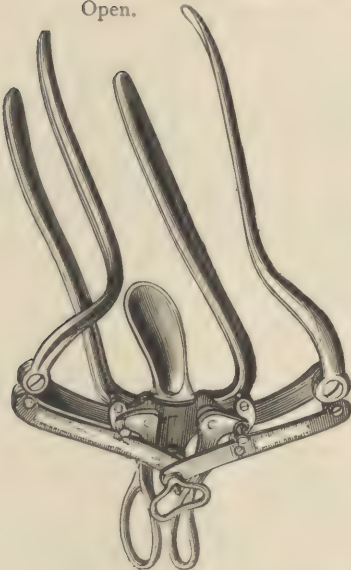


FIG. 3195.—Jenks' Speculum.

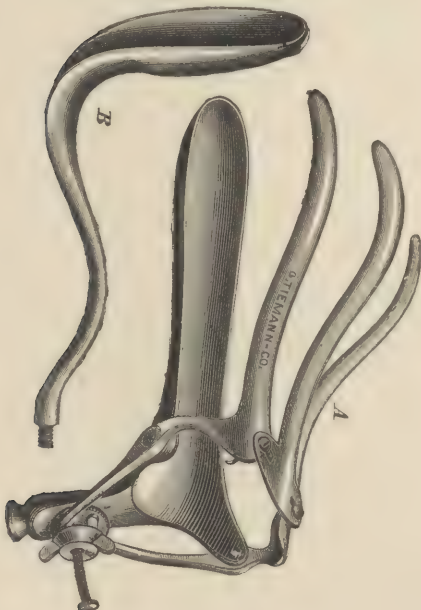


FIG. 3196.—Bivalve Speculum.

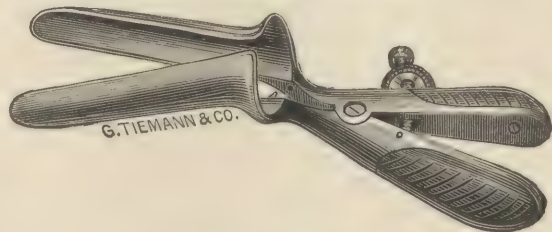
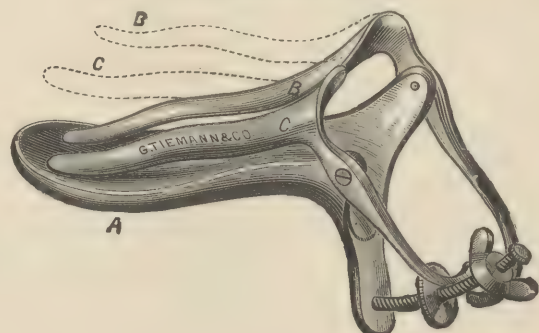


FIG. 3197.—Blake White's Speculum.



GYNÆCOLOGICAL.

FEMALE ORGANS OF GENERATION.

Appendages of the Uterus. (Continued.)

“*Structure.*—The Fallopian tube consists of three coats: serous, muscular and mucous. The *external or serous coat* is derived from the peritoneum. The *middle muscular coat* consists of an external longitudinal and an internal or circular layer of muscular fibres continuous with those of the uterus. The *internal or mucous coat* is continuous with the mucous lining of the uterus, and at the free extremity of the tube with the peritoneum. It is thrown into longitudinal folds in the outer part of the tube, which indicate its adaptation for dilatation, and is covered by columnar ciliated epithelium. This form of epithelium is also found on the inner and outer surfaces of the fimbriæ.

The Ovaries.

“The *ovaries (testes muliebres, Galen)* are analogous to the testes in the male. They are oval-shaped bodies, of an elongated form, flattened from above downwards, situated one on each side of the uterus, in the posterior part of the broad ligament behind and below the Fallopian tubes. Each ovary is connected, by its anterior margin, to the broad ligament; by its inner extremity to the uterus by a proper ligament, the ligament of the ovary; and by its outer end to the fimbriated extremity of the Fallopian tube by a short ligamentous cord. The ovaries are of a whitish color, and present either a smooth or puckered uneven surface. They are each about an inch and a half in length, three-quarters of an inch in width, and about a third of an inch thick; and weigh from one to two drachms. The surface and posterior convex border are free, the anterior straight border being attached to the broad ligament.

“*Structure.*—The ovary is invested by peritoneum, excepting along its anterior attached margin; beneath this is the proper fibrous covering of the organ, the *tunica albuginea*, which is extremely dense and firm in structure, and incloses a peculiar soft fibrous tissue, or stroma, abundantly supplied with bloodvessels. Imbedded in the meshes of this tissue are numerous small, round, transparent vesicles, in various stages of development; they are the *Graafian vesicles*, the ovisacs containing the ova. In women who have not borne children, they vary in number from ten to fifteen or twenty; and in size from a pin's head to a pea; but Dr. Martin Barry has shown that a large number of microscopic ovisacs exist in the parenchyma of the organ, few of which produce ova. These vesicles have thin, transparent walls, and are filled with a clear, colorless, albuminous fluid.

“The *Graafian vesicles* are, during their early development, small and deeply seated in the substance of the ovary; as they enlarge, they approach the surface, and, when mature, form small projections on the exterior of the ovary beneath the peritoneum. Each vesicle consists of an external fibro-vascular coat connected with the surrounding stroma of the ovary by a network of bloodvessels, and an internal coat, named *ovicapsule*, which is lined by a layer of nucleated cells, called the *membrana granulosa*. The fluid contained in the interior of the vesicles is transparent and albuminous, and in it is suspended the ovum. The formation, development and maturation of the Graafian vesicles and ova continue uninterruptedly from infancy to the end of the fruitful period of woman's life. Before puberty, the ovaries are small, the Graafian vesicles contained in them minute and few in number; and few, probably, ever attain full development, but shrink and disappear, their ova being incapable of impregnation. At puberty the ovaries enlarge, are more vascular, the Graafian vesicles are developed in greater abundance and their ova are capable of fecundation.

“*Discharge of the Ovum.*—The Graafian vesicles, after gradually approaching the surface of the ovary, burst; the ovum and fluid contents of the vesicles are liberated and escape on the exterior of the ovary, passing from thence into the Fallopian tube, the fimbriated processes of which are supposed to grasp the ovary, the aperture of the tube being to the part corresponding to the matured and bursting vesicle. In the human subject, and most mammalia, the maturation and discharge of the ova occur at regular periods only, and are indicated, in the mammalia, by the phenomenon of heat or rut, and, in the human female, by menstruation. Sexual desire is more intense in females at this period, and if the union of the sexes takes place, the ovum may be fecundated.

“*Corpus Luteum.*—Immediately after the rupture of a Graafian vesicle and the escape of its ovum, the vesicle is filled with blood-tinged fluid; and in a short time the circumference of the vesicle is occupied by a firm, yellow substance, which is probably formed from plasma exuded from its walls. Dr. Lee believes that this yellow matter is deposited outside both the membranes of the follicle; Montgomery regards it as placed between the layers; while Kölliker considers it as a thickening of the inner layer of the outer coat of the follicle. The exudation is at first of a dark brown or brownish-red color, but it soon becomes paler and its consistence more dense. For every follicle in the ovary from which an ovum is discharged, a corpus luteum will be found. But the character it exhibits and the changes produced in it will be determined by the circumstance of the ovum being impregnated or not.

“Although there is little doubt that corpora lutea exist in the ovaries after the escape of the ova, independent of coitus or impregnation, it appears that the corpus luteum of pregnancy (true corpus luteum) possesses characters by which it may be distinguished from one formed in a follicle, from which an ovum has been discharged without subsequent impregnation (false corpus luteum).

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FIG. 3198.—Steel Bivalve Speculum.

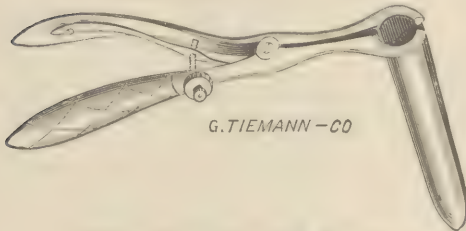


FIG. 3200.—Leonard's Speculum.

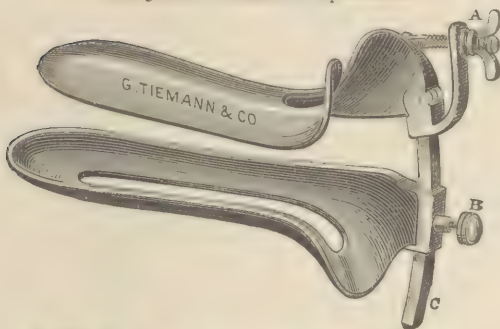


FIG. 3201.—Hunter's Speculum.



FIG. 3203.—Thomas' Cusco's Speculum.

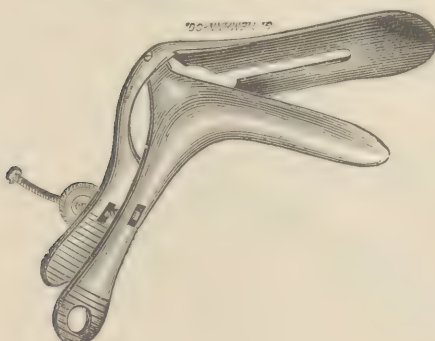


FIG. 3199.—Hale's Speculum.

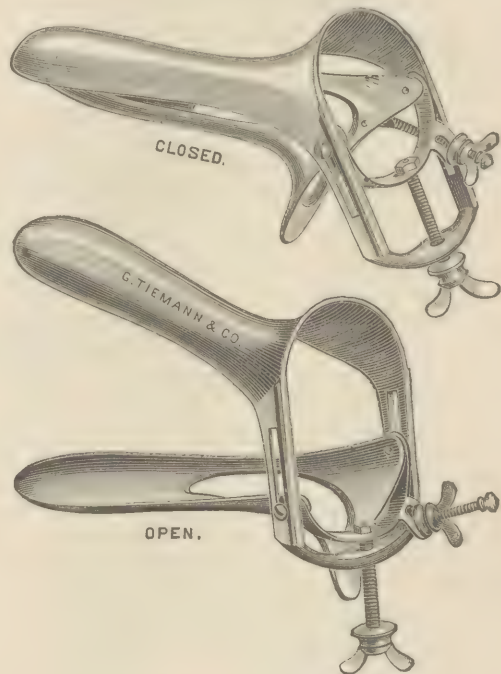


FIG. 3202.—Howard's Speculum.

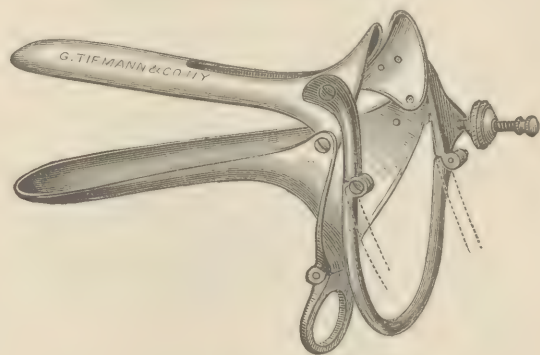
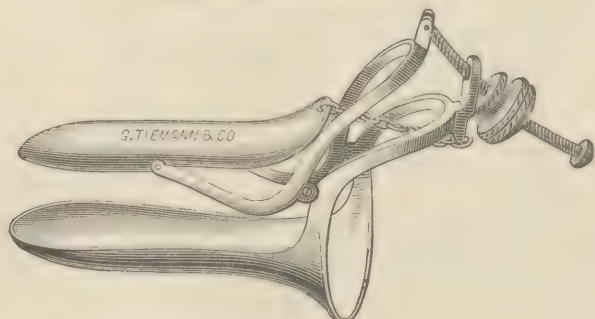


FIG. 3204.—Dicken's Speculum.



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FEMALE ORGANS OF GENERATION.

The Ovaries. (Continued.)

"The *true corpora lutea* are of large size, often as large as a mulberry; of a rounded form and project from the surface of the ovary; the summit of the projection presenting a triangular depression or cicatrix, where the peritoneum appears to have been torn. They contain a small cavity in their centre during the early period of their formation, which becomes contracted and exhibits a stellate cicatrix during the latter stages of pregnancy. Their vascularity, lobulated or puckered appearance, firm consistence and yellow color are also characteristic marks of true corpora lutea.

"*False corpora lutea* are of small size, do not project from the surface of the ovary, are angular in form, seldom present any cicatrix, contain no cavity in their centre: the material composing them is not lobulated, its consistence is usually soft, often resembling coagulated blood; the yellow matter exist in the form of a very thin layer, or more commonly is entirely wanting. False corpora lutea most frequently result from the effusion into the cavities of the Graafian vesicles of serum or blood, which subsequently undergoes various changes and is ultimately removed. Dr. Lee states that, in the false corpora lutea, the yellow substance is contained within, or attached to, the inner surface of the Graafian vesicle and does not surround it, as in the case of true corpora lutea.

"In the foetus, the ovaries are situated, like the testes, in the lumbar region near the kidneys. They may be distinguished from those bodies at an early period by their elongated and flattened form and by their position, which is at first oblique and then nearly transverse. They generally descend into the pelvis. Lying above the ovary, in the broad ligament between it and the Fallopian tube, is the *organ of Rosenmüller*, called also *parovarium* or *epoophoson*. This is the remnant of a foetal structure, the development of which has been described in the introduction. In the adult it consists of a few closed convoluted tubes lined with epithelium, some of them atrophied, and one usually distinguishable from the rest by ending in a bulbous or hydatid swelling. The parovarium is connected at its uterine extremity with the remains of the Wolffian duct, the duct of Gaertner.

"The *ligament of the ovary* is a rounded cord, which extends from each superior angle of the uterus to the inner extremity of the ovary; it consists of fibrous tissue and a few muscular fibres derived from the uterus.

"The *round ligaments* are two rounded cords, between four and five inches in length, situated between the layers of the broad ligament in front of and below the Fallopian tube. Commencing on each side, at the superior angle of the uterus, this ligament passes forwards and outwards through the internal abdominal ring, along the inguinal canal to the labia majora, in which it becomes lost. The round ligament consists of areolar tissue, vessels and nerves, besides a dense bundle of fibrous tissue, and muscular fibres prolonged from the uterus, inclosed in a duplicature of peritoneum, which, in the foetus, is prolonged in the form of a tubular process for a short distance into the inguinal canal. This process is called the *canal of Nuck*. It is generally obliterated in the adult, but sometimes remains pervious even in advanced life. It is analogous to the peritoneal pouch which accompanies the descent of the testes.

"*Vessels and Nerves.*—The *arteries* of the ovaries and Fallopian tubes are the ovarian from the aorta. They anastomose with the termination of the uterine arteries, and enter the attached border of the ovary. The *veins* follow the course of the arteries; they form a plexus near the ovary, the *pampiniform plexus*. The *nerves* are derived from the inferior hypogastric, or pelvic plexus and from the ovarian plexus, the Fallopian tube receiving a branch from one of the uterine nerves."—"Gray's Anatomy."

Care in the Application of Instruments in Operating on the Female Genitalia.

"1st. Before and after every operation wash all instruments in very hot carbolized water, and during every operation keep all instruments immersed in carbolized water. This should especially be observed in regard to needles and sutures.

"2d. In all laparotomy operations pursue Lister's antiseptic method fully.

"3d. Where the spray is not employed, always bathe denuded surfaces, both before and after apposition by suture, with carbolized water.

"4th. Always destroy sponges used in an operation which admits of the possibility of these being contaminated by septic fluids; when they are employed a second time always have them immersed previously in boiling carbolized water.

"5th. After all operations upon the uterus bathe or spray the vaginal portion of the organ with carbolized water, and tampon lightly for twenty-four hours with antiseptic cotton. This being removed, syringe the vagina with carbolized water at short intervals.

"6th. After all operations on the pelvic organs syringe the vagina with carbolized water as often as once in every eight hours.

"8th. Before every operation let the operator and his assistants cleanse and disinfect their hands as if they felt sure that septic material attached to them.

"9th. Avoid even trivial operations, unless good reason for doing otherwise exist, for a few days before and after menstruation."—Thomas, "On the Diseases of Women." 1880.

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FIG. 3205.—Storer's Speculum, when used as Cusco's.

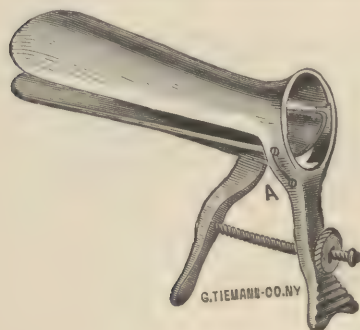


FIG. 3207.—Storer's Speculum, when used as Sims'.

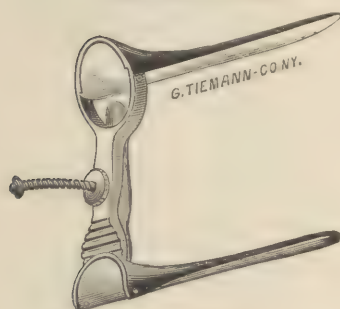


FIG. 3209.—Wackerhagen's Speculum.

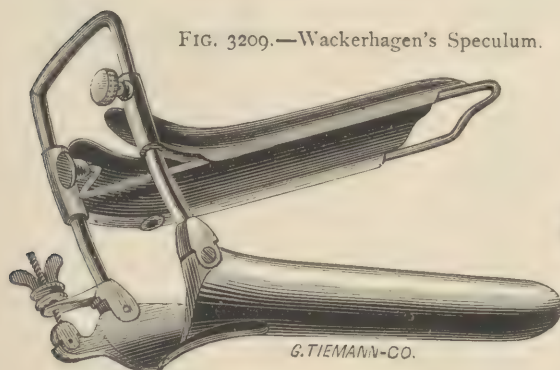


FIG. 3211.—Nott's Speculum (plain).

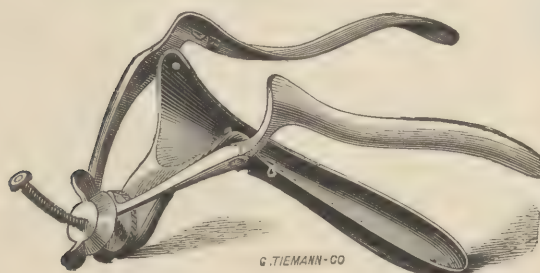


FIG. 3206.—Keene's Speculum Vaginæ, at Rest.

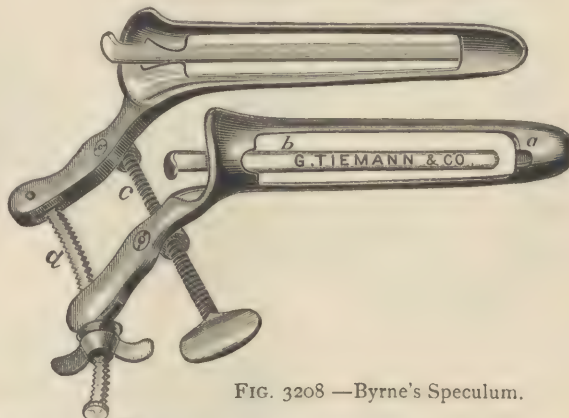


FIG. 3208 —Byrne's Speculum.

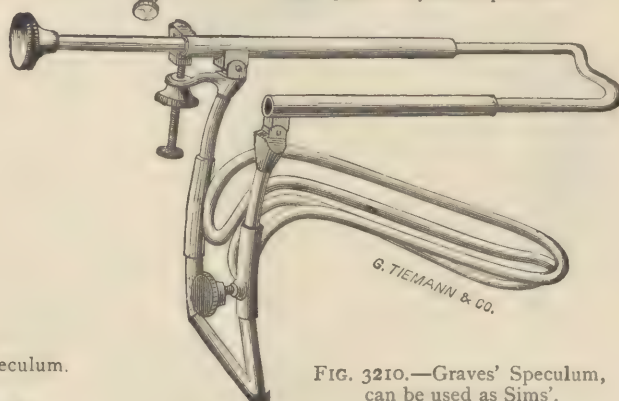
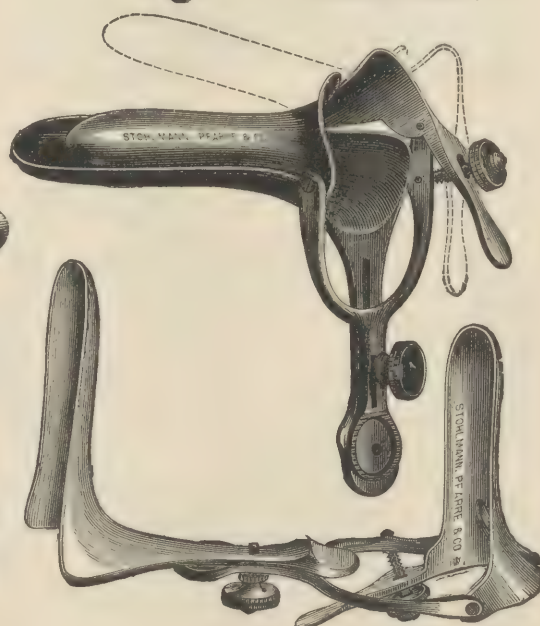


FIG. 3210.—Graves' Speculum, can be used as Sims'.



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FIG. 3212.—Sims' Speculum.



FIG. 3213.—Sims' Vaginal Dilator.

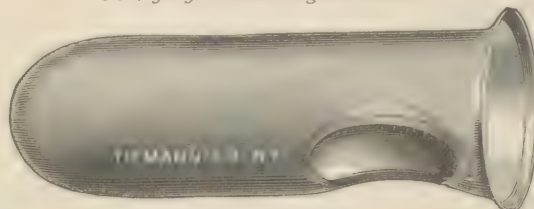


FIG. 3215.—Baxter's Speculum.



FIG. 3214.—Bozeman's Duck-Bill Speculum.

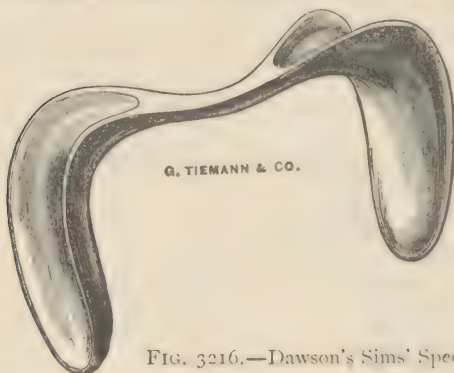


FIG. 3216.—Dawson's Sims' Speculum.

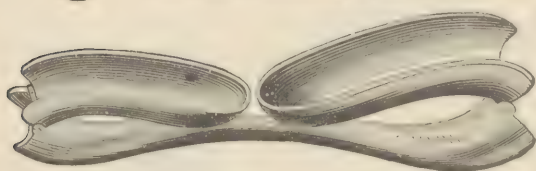
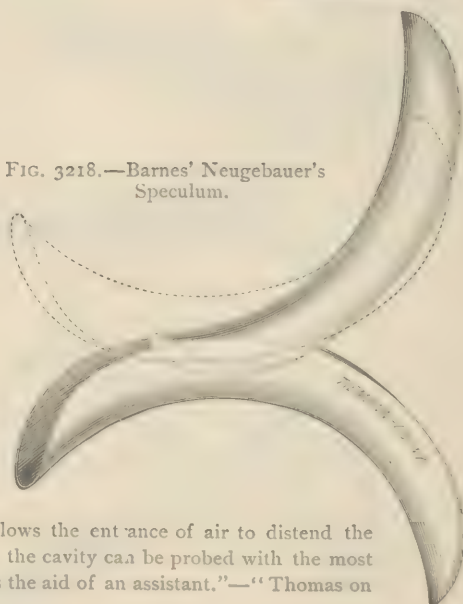


FIG. 3217.—Dawson's Sims' Dilating Speculum.



FIG. 3218.—Barnes' Neugebauer's Speculum.



"Sims' speculum elevates the posterior vaginal wall, which allows the entrance of air to distend the whole passage, the woman lying on her side in such a manner that the cavity can be probed with the most perfect ease and applications made to the fundus. Its use requires the aid of an assistant."—"Thomas on Diseases of Woman."

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FIG. 3219.—Sims' Bivalve Speculum.

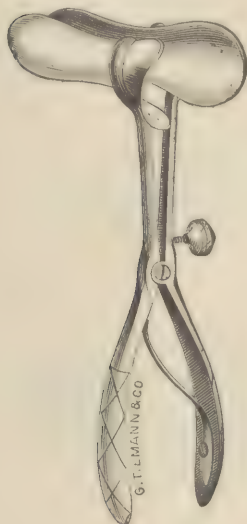


FIG. 3220.—Cracour's Mirror Speculum.

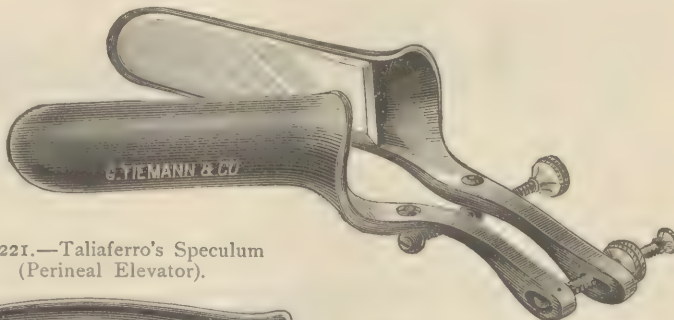


FIG. 3221.—Taliaferro's Speculum (Perineal Elevator).



FIG. 3222.—Thomas' Sims' Speculum.



FIG. 3223.—Yarrow's Speculum.

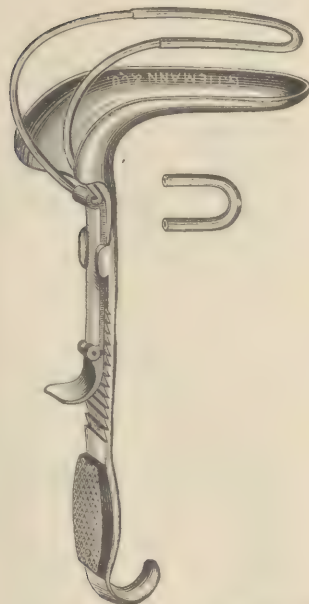


FIG. 3224.—Thomas' Self-Retaining Speculum.

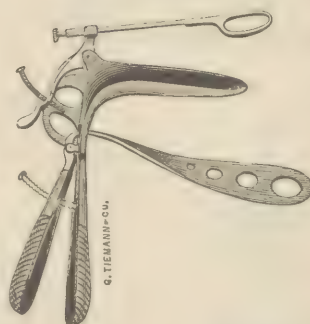


FIG. 3225.—Thomas' Speculum.

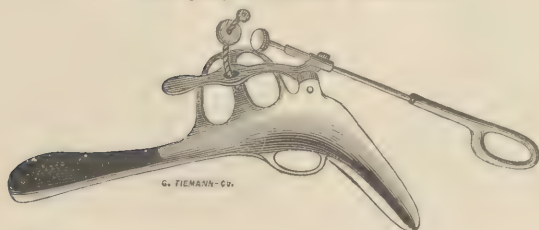
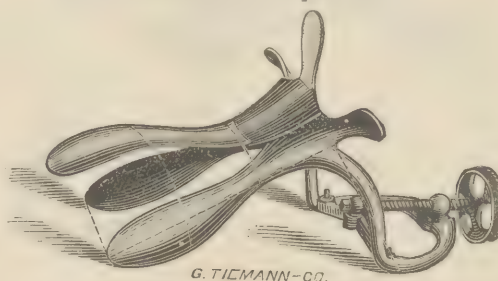


FIG. 3226.—Bozeman's Speculum.



GYNÆCOLOGICAL.

SPECULA VAGINÆ.

For Facilitating Inspection, Exploration, Applications and Operations.

FIG. 3227.—King's Pelvimeter.

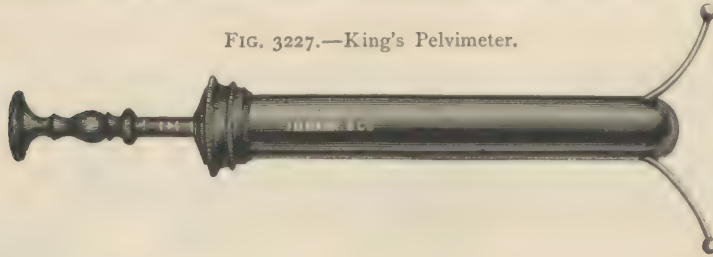


FIG. 3228.—Hank's Speculum.

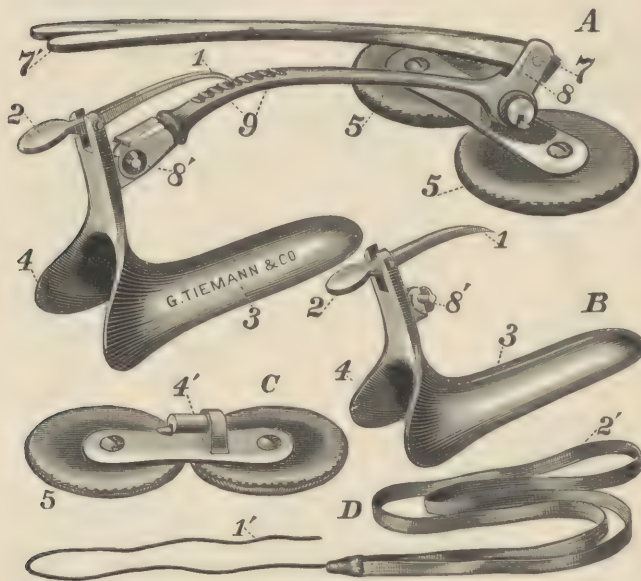


FIG. 3229.—Blake White's Sims' Speculum.



FIG. 3230.—Darrow's Self-Retaining Sims' Speculum.



FIG. 3231.—Fryer's Speculum.



GYNÆCOLOGICAL.

SPECULA VAGINÆ.

For Facilitating Inspection, Exploration, Applications and Operations.

FIG. 3232.—Schuyler's Combination Specula.

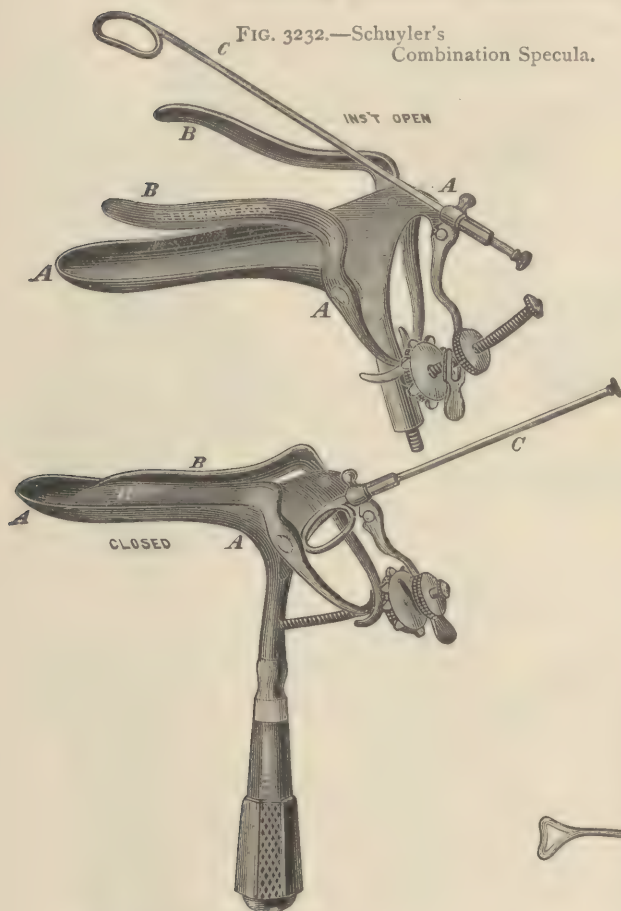


FIG. 3233.—Fryer's Self-Retaining Speculum.

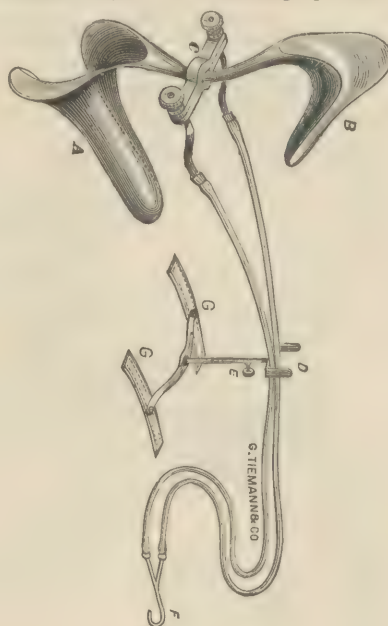


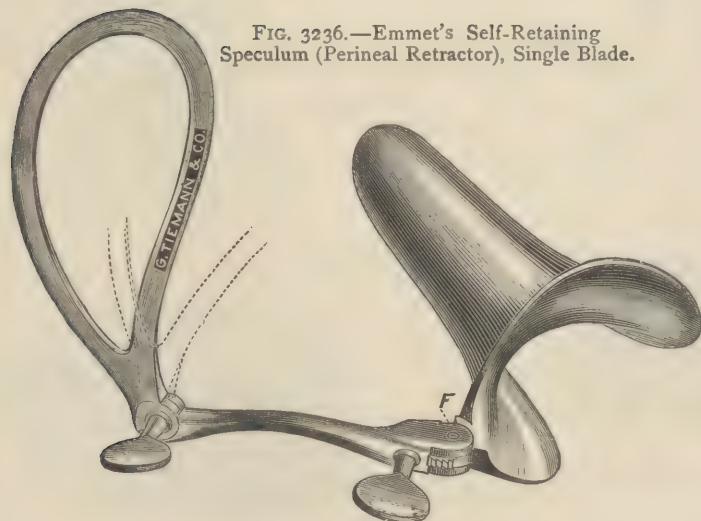
FIG. 3234.—Nott's Depressor.



FIG. 3235.—Garrigue's Vaginal Depressor.



FIG. 3236.—Emmet's Self-Retaining Speculum (Perineal Retractor), Single Blade.



GYNÆCOLOGICAL.

SPECULA VAGINÆ.

For Facilitating Inspection, Exploration, Applications and Operations.

FIG. 3237.—Dawson's Modification of Erich's Speculum.

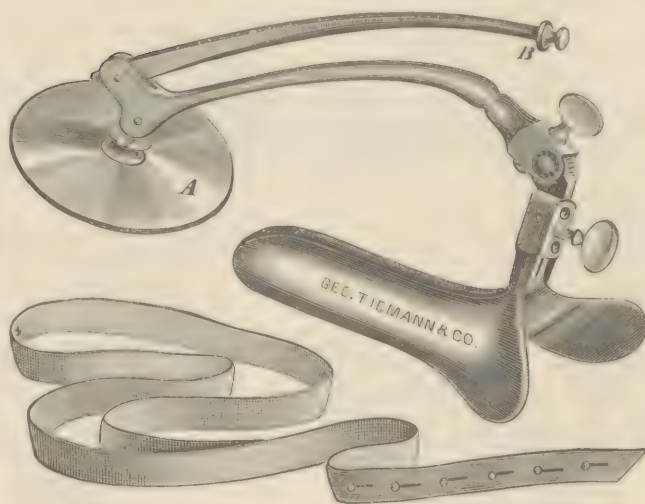


FIG. 3238.—Taylor's Speculum.



FIG. 3239.—Bart's Self-Retaining Speculum.



FIG. 3241.—Bozeman's Vaginal Dilator.

FIG. 3240.—Reid's Speculum.

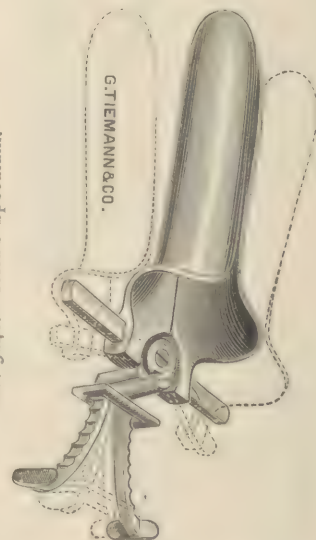
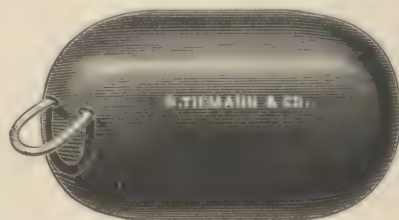


FIG. 3242.—Bozeman's Vaginal Dilator.



GYNÆCOLOGICAL.

SPECULA VAGINÆ.

For Facilitating Inspection, Exploration, Applications and Operations.

FIG. 3243.—Nunn's Speculum.

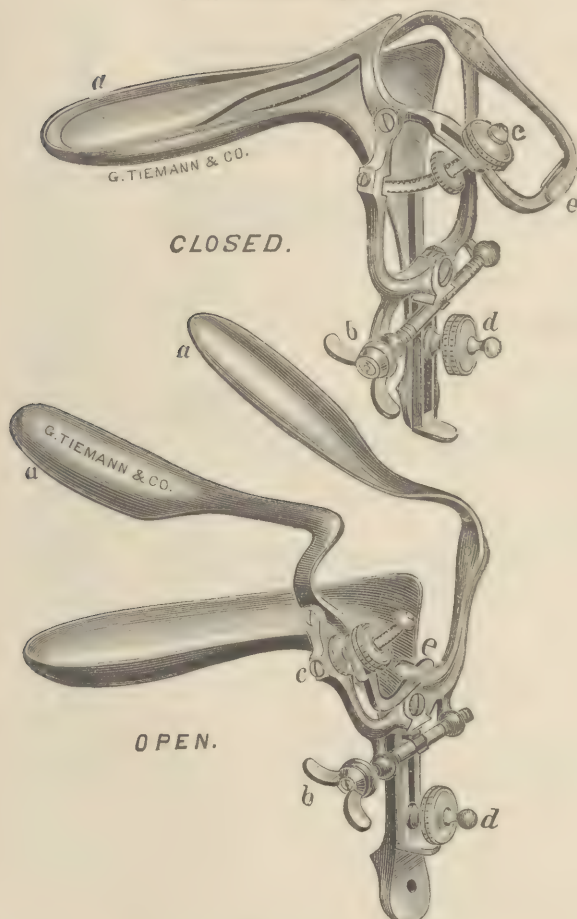


FIG. 3244.
Bozeman's Set of 3 Columning Specula.

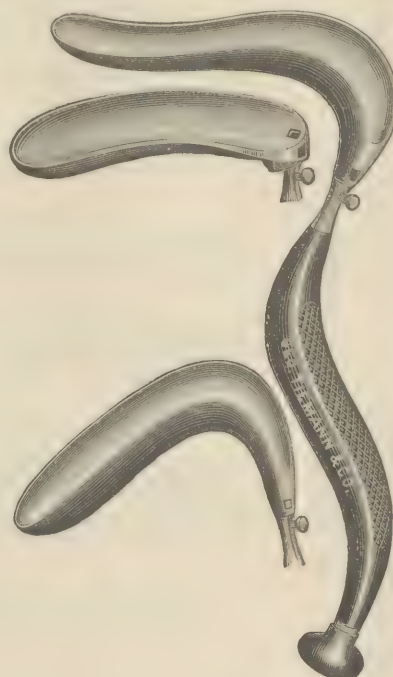


FIG. 3245.—Hunter's Speculum.

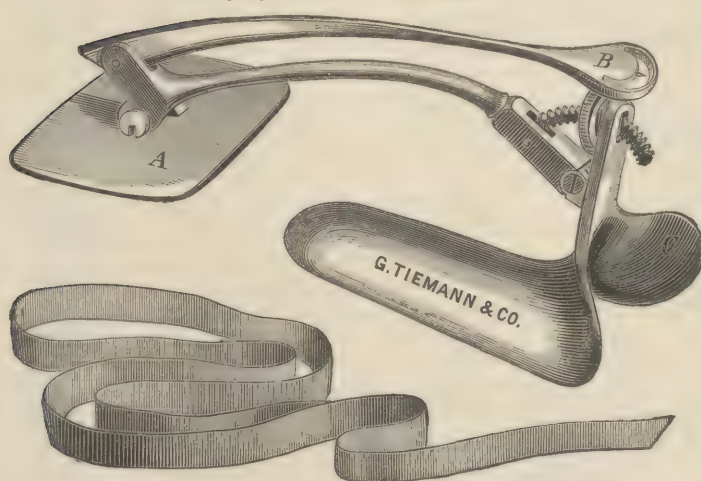


FIG. 3246.—Munde's Speculum.



GYNÆCOLOGICAL.

VESICO AND RECTO-VAGINAL FISTULA.

Depressors for the Anterior Walls of the Vagina, to clear the field of operation.

FIG. 3249.—Nott's Depressor.

G. TIEMANN, CO.

FIG. 3250.—Sims' Depressor.

G. TIEMANN & CO.

FIG. 3251.—Sims' Double Depressor.

G. TIEMANN & CO.

FIG. 3252.—Hunter's Depressor.

G. TIEMANN & CO.

FIG. 3253.—Bozeman's Urethral and Perineal Depressor.

G. TIEMANN & CO.

FIG. 3247.—Bozeman's Depressor.

G. TIEMANN & CO.

FIG. 3248.—Bozeman's Double-hooked Depressor.

G. TIEMANN & CO.

FIG. 3254.—Sponge-Holder, Iron, Ebony Handle.



"To J. Marion Sims the world is indebted for suggesting and perfecting the measures by which this formerly intractable condition is rendered one of the most certain of relief within the field of surgery. It is true that, in every particular feature of the operation on which his success depended, Dr. Sims had been anticipated. In our own country, Dr. H. S. Levert, of Mobile, Alabama, had published (*American Journal of the Medical Sciences*, May, 1829) his experiments in the use of silver wire. Mr. A. Gosset, in a letter to the *Lancet*, November 21, 1834, gave an account of his method and success in closing a vesico-vaginal fistula which had been produced by the cutting through of a stone in the bladder. He used interrupted sutures of gilded silver wire, which were twisted, and as clearly defines the advantages of the metallic sutures as if given in the words of Dr. Sims himself. The method of Metzler was published in Germany in 1846, and in the article not only is Sims' Speculum essentially described, but also the use of clamp sutures and the mode of denuding the edges of the fistula with scissors, the patient being in the knee-chest position. In this country Hayward, of Boston, had been successful, between 1836 and 1840, with the silk suture; while Dr. Mettauer, of Virginia, in 1847, had used the lead suture, and in the account of his operation expressed his conviction that every case of vesico-vaginal fistula could be cured. Yet, withal, were we assured of the fact that Dr. Sims was as familiar as we are at the present time with what had been accomplished before his day, it should not lessen the credit due him. What had been done fell on barren soil, bore no fruit, was not appreciated, and was destined to be forgotten. From Dr. Sims' hand the operation was accepted by the profession; it was immediately put into successful practice and to the present day it has not been materially modified. His first article on the subject was published in the *American Journal of the Medical Sciences*, in 1852, and this, with his address before the New York Academy of Medicine, in 1857, on "Silver Sutures in Surgery," may be regarded as a summary of his experience, for since the latter date he has given nothing to the profession on the subject. Within the period between the two papers he materially modified the mode of securing the edges of the fistula. At first he employed the clamp or shot suture. Finally he adopted the simple interrupted metallic suture secured by twisting, as Mettauer and Gosset had done before him."—"Principles and Practice of Gynæcology." Emmet. 1884.

FIG. 3255.—Sponge-Holder, German Silver.



GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

Tenacula and Forceps for Seizing and Holding.

FIG. 3256.—Sims' Tenaculum.



FIG. 3257.—Emmet's Tenaculum.



FIG. 3258.—Emmet's Tenaculum.

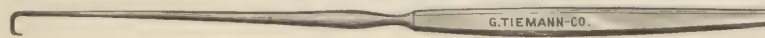


FIG. 3259.—Emmet's Heavy Shank Tenaculum.

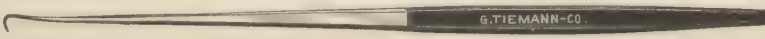


FIG. 3260.—Perry's Barbed Tenaculum.



FIG. 3261.—Emmet's Tenaculum.



FIG. 3262.—Double Hook.



FIG. 3263.—Bozeman's Tenaculum.



FIG. 3264.—Sims' Tenaculum.



FIG. 3265.—Emmet's Tenaculum.

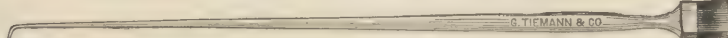


FIG. 3266.—Bozeman's Long Tenaculum.



FIG. 3267.—Skene's Seizing Forceps.



FIG. 3268.—Skene's Seizing Forceps, with Lock.



FIG. 3269.—Thomas' Tissue Forceps.



FIG. 3270.—Long Angular Tenaculum.



FIG. 3272.—Self-Closing Seizing Forceps.



FIG. 3271.—Long Stout Tenaculum.

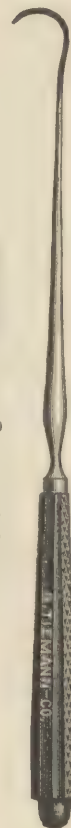
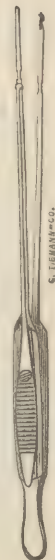


FIG. 3273.—Sims' Seizing Forceps.



GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

Sims' Operation.

"This operation may be divided into three parts: 1st. *Paring the edges*; 2d. *Passing sutures through them*; 3d. *Approximating them and securing the sutures*. The patient, being placed upon a table,* two and a half by four feet, which is covered by folded blankets, is brought under the influence of an anæsthetic and placed in the following position. She is made to lie on the left side, with the thighs bent at about right angles with the pelvis, the right a little more flexed than the left. The left arm is placed behind her back and the chest brought flat down upon the table so that the sternum may touch it. The assistant who is to hold the speculum, which is then introduced, does so with the right hand, while with the left he elevates the right side of the nates. The table should be so arranged that a bright and steady light may fall into the vagina, which, being then fully distended, will be seen throughout its extent, except where it is obscured by the speculum. The operator, having near him all the instruments, &c. (Sims' set), which he will require, places his assistants thus: one holds the speculum, another administers the anæsthetic, and a third stands ready at his right hand to remove the blood accumulating in the vagina, by means of sponges in the

FIG. 3274.—Sims' Sponge-Holder.



sponge-holders, which are rapidly washed in a basin of water that stands by his side, to be used again. A fourth assistant, if attainable, may be well employed in handing the instruments as they are required. All being ready, he proceeds with the first step of the operation.

"1. *Paring the Edges of the Fistula*.—The edge of the fistula, at the point which is deemed most difficult of access and manipulation, is caught by a tenaculum, or with, what I much prefer, the tooth (tissue) forceps (page 449) and held up. Then, with a pair of long handled scissors, or a knife (page 452), a strip is cut, extending from the mucous membrane of the bladder to that of the vagina, care being taken not to wound the former. Another portion of the edge is then seized and removed like the first. The wound thus left should be one beveled from the vesical surface outwards and great care should be observed to remove the entire border, for upon this success depends. * * The abraded surface, from the edge of the fistula to the point of vaginal section, should measure at least four lines, one-third of an inch, while above, it should just touch the vesical border, not invading its mucous membrane. During this part of the operation the sponges, held in the long handled sponge-holders (Fig. 3274), will have to be freely resorted to, but the bleeding generally soon ceases and the operator may proceed to the second step.

"2. *Passing the Sutures*.—The sutures are passed by means of slightly curved needles, held in a pair of strong forceps (Figs. 3303, 3305) made for the purpose. In some cases the metallic thread, made of annealed silver, which is employed, may be passed at once, but usually silk threads are first passed and the silver sutures are attached and drawn through. * * * The needles which we employ in the Woman's Hospital are about three-quarters of an inch long, round, slightly curved and without cutting edges anywhere (Fig. 1320). The needle, held in the grasp of the needle-holder, should be passed at the angle of the wound which is most difficult of access, half an inch from the edge of the incision and brought out at the vesical surface, but not involving its mucous lining. The point of the needle having passed out, it is engaged by the small blunt hook (Fig. 3275) until it can be seized and drawn through

FIG. 3275.—Sims' Blunt Hook.



by the needle forceps. Then it is plunged into the other lip and drawn out half an inch from the edge of the incision. The ends of the silk sutures are then given into the charge of the assistant holding the speculum, and another is passed in the same way at the distance of one-sixth of an inch from the first. In this way a sufficient number are passed to close the fistula. During this procedure the edge of the fistula is to be fixed by the tenaculum, and, should firm opposing force be needed to make the needle pass, it may be given by the blunt hook. When the needle is seized by the forceps and pulled so as to make the thread follow it, some opposing force is needed, or the thread might cut

FIG. 3276.—Sims' Pulley or Fork.



through the tissues. This force is offered in the species of fork represented, which is put as a fulcrum under the thread at its point of exit, and made to sustain and draw it through. A bit of silver wire about twelve inches long is attached by bending its extremity to the first silk suture, and, by the use of the fork just mentioned, the silk thread is drawn through so as to make the wire replace it. The silk is then cut off, the silver suture put aside, and the operator proceeds to

* See "OPERATING FURNITURE," page 51.

GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

Sims' Operation. (Continued.)

replace each silk thread in the same way. This being accomplished, the instruments are then changed, in order to effect the twisting of the sutures.

"3. *Twisting of the Sutures.*—The ends of the silver sutures being drawn together by the fingers, the adjuster (Fig. 3277) is slipped down over the wires and pressed against the wound, after carefully approximating the edges,

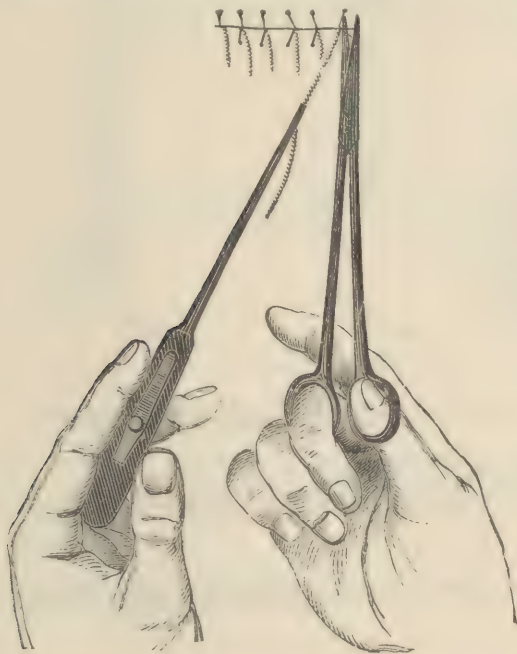
each thread is slightly twisted, so as to keep the whole in apposition. Then the ends of the first suture are seized in the bite of the twisting forceps

FIG. 3277.—Sims' Wire Adjuster or Fulcrum.



FIG. 3278.

Twisting Forceps and Scissors, for Cutting the Wire.



and torsion is made, so as to close the wound completely at this point. In this way the sutures are twisted one after the other, care being taken not to carry the tension so far as to strangle the tissues engaged in the constricting loop. Each suture is then clipped by a pair of scissors, about half an inch from the edge of the fistula, and by means of forceps pressed flat against the vaginal wall, so as not to wound the opposite surface. The bladder should then be syringed out, to remove all blood which may have accumulated there; for, if a large clot should be retained in this viscus, it may cause severe vesical tenesmus, and smaller ones may block up the mouth of the catheter, which is to be kept in place permanently, and call for its repeated removal.

FIG. 3279.—Sims' Sigmoid Catheter.



"The patient is then placed in bed by the assistant, an opiate is administered, and a Sim's sigmoid catheter is passed into the bladder and left there. The mouth of this instrument projects beyond the vulva, so that under it a small china dish may be placed, which will receive the urine as it passes through."—"Treatise on the Diseases of Women." Gaillard Thomas, M. D.

"To Sims' sigmoid or self-retaining catheter (Fig. 3279) I am satisfied that we are greatly indebted for success in this operation, as well as for much comfort which it affords the patient. It should be made of block-tin, that the curve may be altered to suit each individual case. * * *

"The catheter must be removed several times a day, for the purpose of cleaning it; this is done by forcing a stream of water through it from a large syringe, and with a wire brush to remove the phopatic deposit. The patient should be instructed to notice carefully that the urine escapes freely at all times. It is well to have two catheters, so that one may be introduced immediately on the removal of the other."—"Principles and Practice of Gynæcology." Emmet. 1884.

"The use of the catheter is by no means as needful after the operation as it was at one time supposed to be. The late Dr. Simon dispensed with it altogether; but there is a golden mean better than dogmatism. In small openings there is no need for it. In larger ones the water should be drawn off every four hours, or a good self-retaining

catheter be used. The best one is the Skene-Goodman. Whenever the self-retaining catheter teases the bladder into tormina, it does more harm than good, and should be at once removed. Sometimes it provokes a hæmorrhage. A medical friend of mine operated four times, and I once, on the same woman, unsuccessfully. Each time Sims' self-retaining catheter was used, and each time an abundant hæmorrhage took place into the bladder. At the sixth time, by withholding the catheter, I saved my patient from having a hæmorrhage, and cured her."—"Lessons in Gynæcology." Goodell.

FIG. 3280.—Skene's Self-Retaining Catheter, modification of Goodman's.



GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

Scissors and Knives for Paring or Vivifying the Edges.

FIG. 3281.—Sims' Curved Scissors, Sharp Points.



FIG. 3282.—Sims' Rotating Knife.

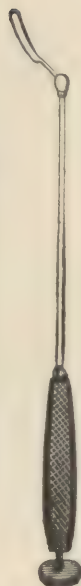


FIG. 3283.—Bozeman's Straight Scalpel.

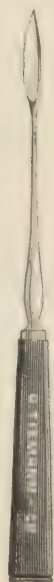


FIG. 3284.—Bozeman's Angular Scalpel, one curved right and one left.



FIG. 3285.—Bozeman's Double Curved Scissors.

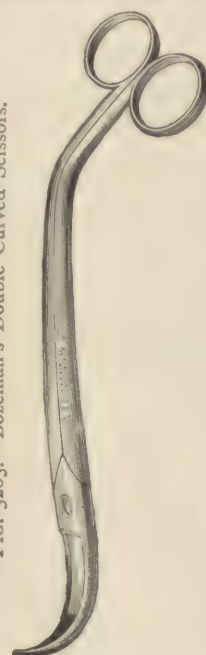


FIG. 3286.—Bozeman's Curved Scissors.

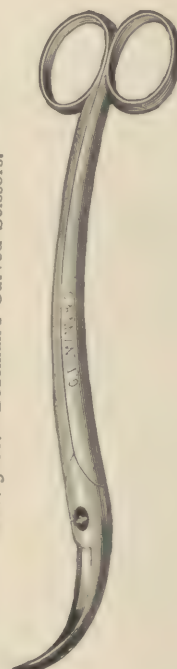


FIG. 3288.—Sims' Scalpel.



FIG. 3289.—Scalpel, Right and Left.



FIG. 3290.—Nott's Knife.

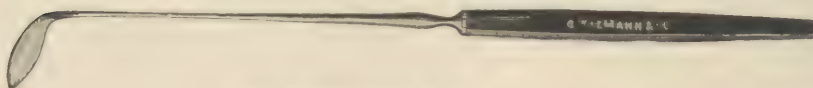


FIG. 3291.—Nott's Angular Knife.

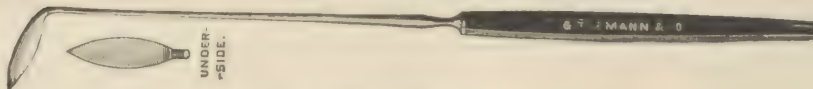


FIG. 3292.—Scott's Knife.



FIG. 3293.—Sims' Probe-Pointed Knife.

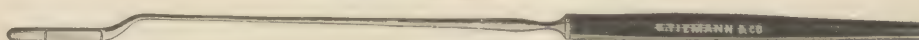


FIG. 3294.—Bozeman's Knife.



FIG. 3287.—Sims' Holder and four Knives.



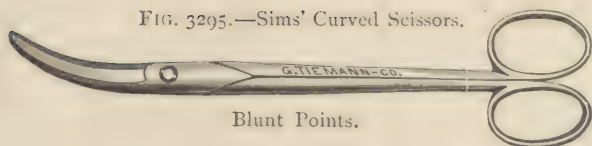
Figs. 3282, 3287 and 3300 are useful at points inaccessible to fixed knives or scissors—the joint permitting the blades to be placed and fixed at any angle.

GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

Scissors for Paring or Vivifying the Edges.

FIG. 3295.—Sims' Curved Scissors.



Blunt Points.

FIG. 3296.—Sims' Straight Scissors.

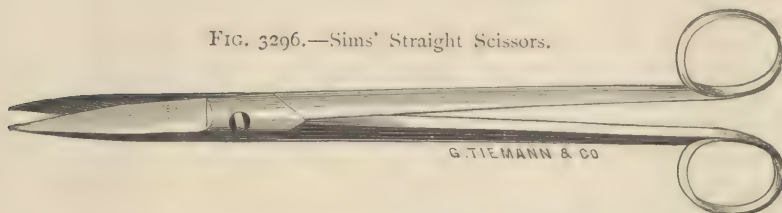


FIG. 3297.—Emmet's Knee-bent Scissors.

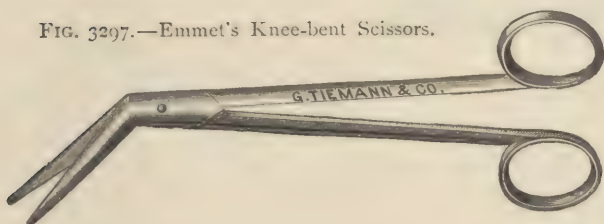


FIG. 3298.—Emmet's Slightly Curved Scissors.

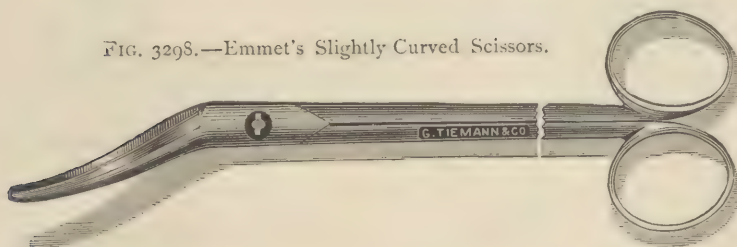


FIG. 3299.—Emmet's Double-curve Scissors.

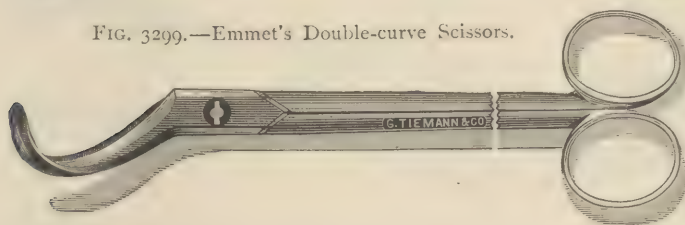


FIG. 3300.—Emmet's Ball and Socket Knife.

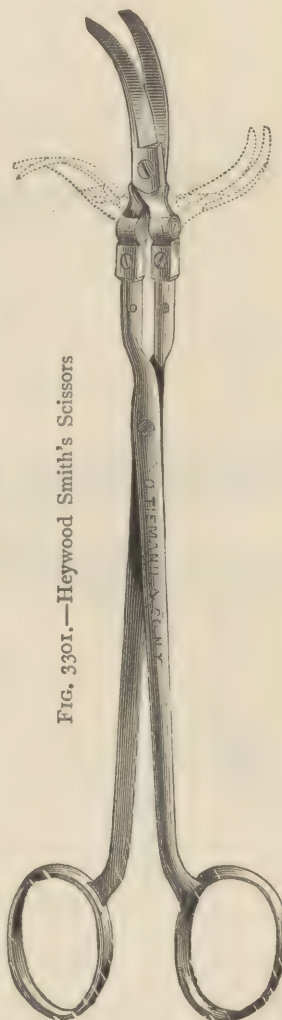


FIG. 3301.—Heywood Smith's Scissors

FIG. 3302.—Thomas' Dilating Forceps, for Separating the Bladder and Vagina.



GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

For Passing the Sutures.

FIG. 3303.—Sims' Needle Forceps.



FIG. 3304.—Tiemann & Co.'s New Needle Forceps (adapted for Hagedorn's Needles).

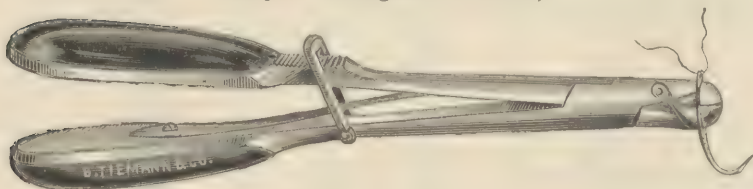


FIG. 3305.—Sims' Needle Forceps, with Catch.

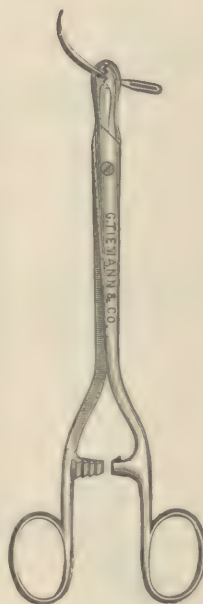


FIG. 3306.—Currie's Canulated Needle, for Wire Sutures in Staphylorrhaphy, Vesico-Vaginal and Fistula in Ano.

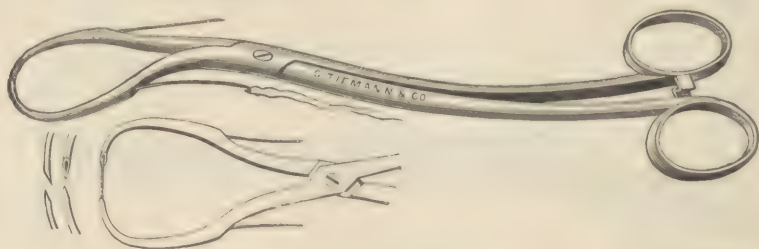


FIG. 3307.—Emmet's Needle Forceps.



FIG. 3308.—Dawson's Needle Forceps.

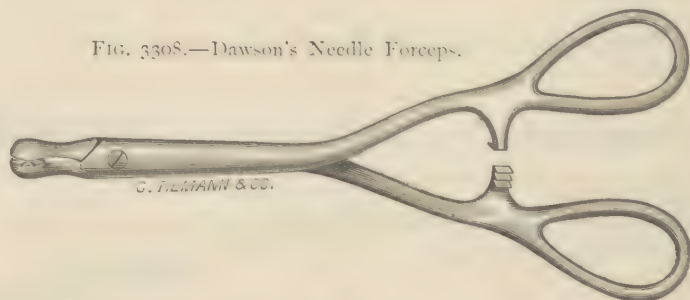
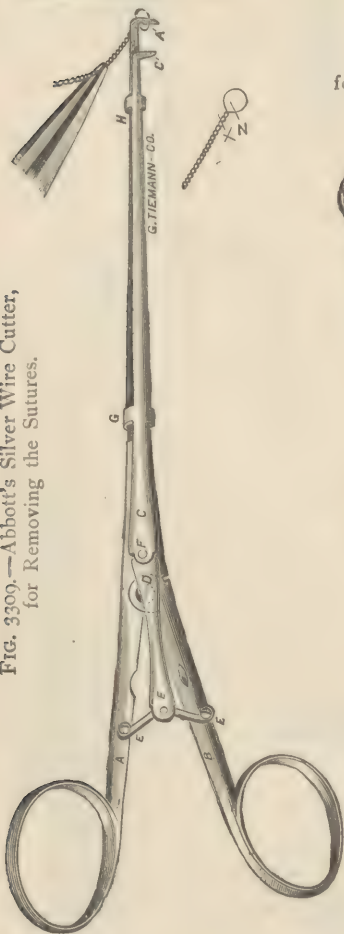


FIG. 3309.—Abbott's Silver Wire Cutter, for Removing the Sutures.



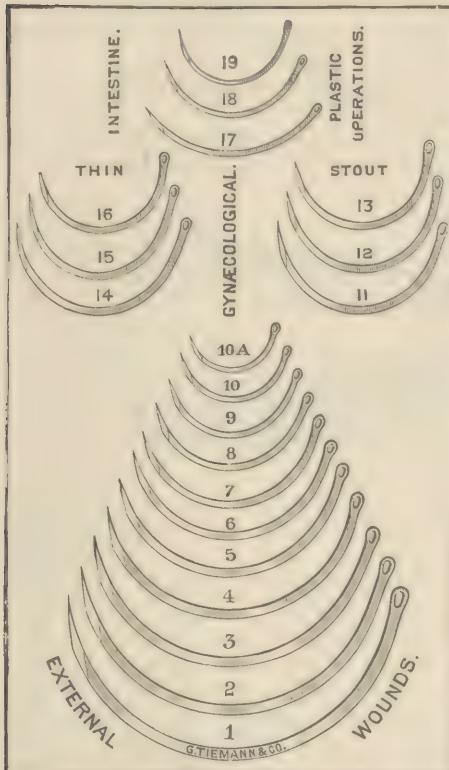
EMMET'S NEEDLES, see Fig. 1320.

GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

For Passing the Sutures.

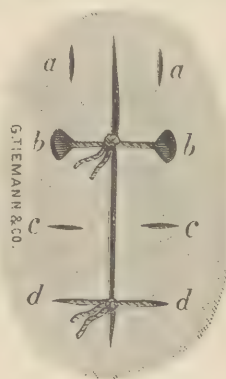
FIG. 3310.—Dr. Hagedorn's Needles.



The advantages claimed by this new kind of needle are :

1. Being curved on the edge, they are more resistant, and the point follows without deviation the intended direction of the puncture.
2. The eye, perforating the flat side, can be made larger and tapering at the terminal end; in consequence of which, even a stout double thread will pass without difficulty through the puncture, which no surgeon will fail to appreciate.
3. The needle, owing to its equal thickness, can be firmly and safely taken hold of at any point, whereby its direction will be much facilitated.
4. The cutting edge being on the convex side, cannot be injured or blunted by the needle-holder and may be easily re-sharpened by the surgeon himself.

FIG. 3311.

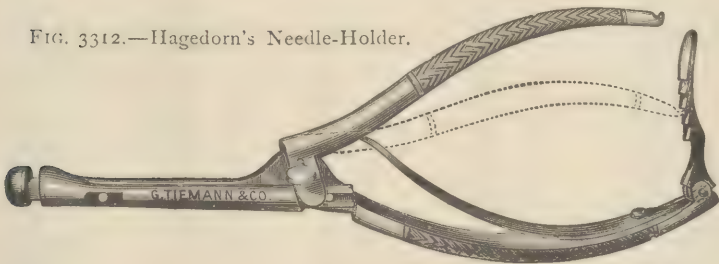


5. The incision of the old cross-edged needles (*a b*) spreads, while the incision made by the new needle is in a right angle to the edge of the wound, similar to a buttonhole. The two edges of the stitch-wound, on tying the sutures, are drawn into close apposition, whereby their union is favored (*c d*).

6. The flat needles cause less injury, which is of high importance, especially in sutures of nerves and tendons.

Hagedorn's holder differs entirely from the usual kinds. It is so constructed that it is made to hold the needle at the flat side; its jaws open and close parallel to each other, and every size of needle, of whatever curve, is held with equal firmness. The breaking of a needle is rendered impossible, even when the strongest pressure is applied. A needle held with the holder is grasped as firmly as if both would bodily form but one single instrument. Moreover, the needle can be disengaged with equal readiness. It holds the needle as firmly at the edge as near or at the

FIG. 3312.—Hagedorn's Needle-Holder.



point, even if the latter emerges ever so little, which is of great importance to the gynæcologist when applying sutures in narrow and deeply situated regions. The point of the needle, after having passed through the tissues, can be seized without injury to itself or to the surrounding soft parts, being guarded by the jaws of the needle-holder. The needle-holder consists of a steel-rod, ending in a handle, upon which a similar shorter rod is made to glide up and down. Both rods form at a right-angle with their anterior termination, the jaw, which is lined with copper. The up and down movement of the rods is effected by a lever-handle, held in position by a movable screw. A ratchet on the lower part of the handle serves for fixing the needle. The first tooth on the ratchet will fix a stout needle, the second and the following third tooth, finer needles. A slight pressure with the little finger on the ratchet will easily release the stop and set the needle free. In using it, the needle-holder is held in such a position that the little finger is near the ratchet, ready for releasing its hold by slightly pressing against it. Attention must be paid that the needle is placed in the longest diameter of the jaw with the inner curve close to the stem of the fixed rod. Only when the needle has been grasped in this manner, will its perfectly firm position be secured.

GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

For Passing the Sutures. (Continued.)

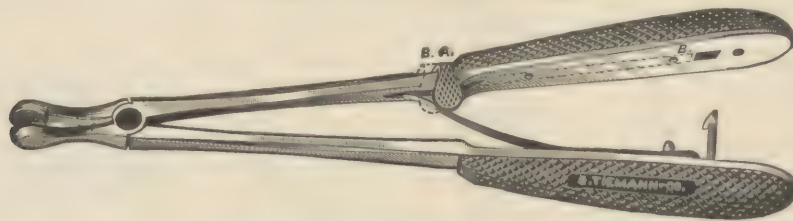
Hagedorn's needle-holders (Fig. 3312) are made of several sizes and strengths, to meet the various requirements. Two kinds are especially made for gynecologists, one with a rectangular and another with an oblique jaw.

1. A strong holder, 16 centimetres ($6\frac{1}{4}$ inches) in length, with a jaw of 8.0 mm. in width, and 7.0 mm. in thickness, will serve for all ordinary surgical purposes and may be used for many years.

2. The smallest holder, 13 centimetres (5 inches) long, with a jaw 5.8 mm. by 5.0 mm. will prove the most useful one for ophthalmic and plastic operations and for intestinal sutures.

3. General practitioners, requiring an instrument combining the advantages of both kinds of needle-holders, will find a middle-sized instrument, 15 centimetres ($5\frac{1}{4}$ inches) long, with a jaw 7 mm. by 6 mm., very handy.

FIG. 3313.—Parrott's Needle Forceps.



Counterpressure and Wire Twisters.

FIG. 3314.—Nott's Needle and Twisting Forceps.



FIG. 3315.—Emmet's Twisting Forceps.



FIG. 3316.—Fitch's Wire Twister.

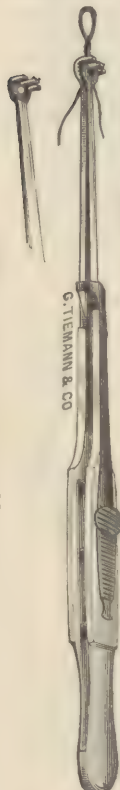


FIG. 3317.—Emmet's Counter-pressure Hook.



FIG. 3318.—Bozeman's Blunt Hook.



FIG. 3319.—Nilsen's Counter-pressure Fork and Tyer.

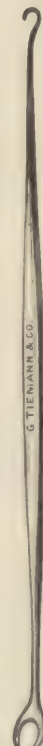


FIG. 3320.—Hank's Counter-pressure Tenaculum.

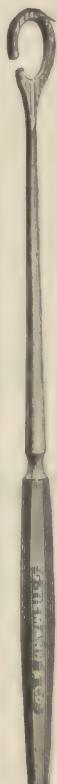


FIG. 3321.—Dawson's Wire Twister.



GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

Bozeman's Button Suture, &c.

FIG. 3322.—Bozeman's Needle Carrier.



FIG. 3325.
Arranging the Button
or Shot Suture.

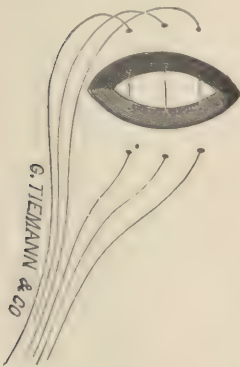


FIG. 3323.—Bozeman's Button Shaper.

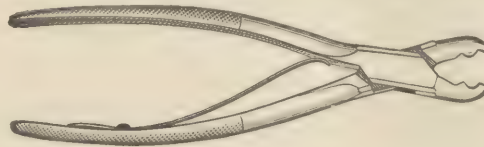


FIG. 3324.
Bozeman's Buttons.

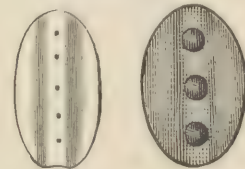


FIG. 3326.
Bozeman's Buttons Applied.



Since 1855, Dr. Bozeman has continued to use what he terms the "button suture." This is a perforated disk of metal, made slightly concave, and fitted accurately to the vaginal surface about the edges of the fistula. Through one of the holes in the row down the centre, the two ends of the sutures are passed together, and over these a perforated shot, which is then compressed at the point needed to secure the sutures.

Other instruments for Bozeman's method are :
Bozeman's Chair, Fig. 1264 ; Bozeman's Specula, Figs. 3214, 3226 ; Bozeman's Depressors, Figs. 3247, 3248, 3253 ; Bozeman's Knives, Figs. 3283, 3284 ; Bozeman's Scissors, Figs. 3285, 3286 ; Bozeman's Vaginal Dilators, Figs. 3241, 3242.



FIG. 3327.
Bozeman's Perineal Elevator.

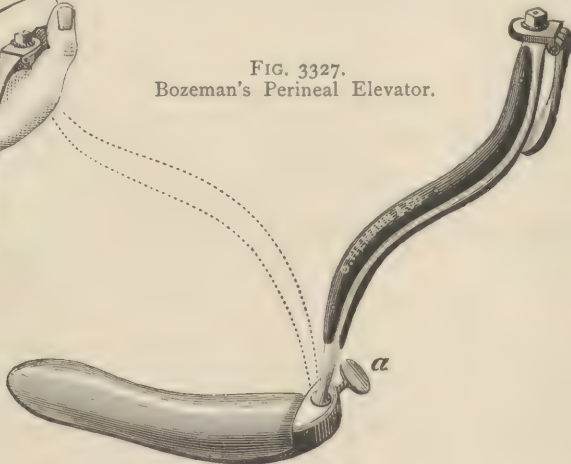


FIG. 3328.—Bozeman's Wire Adjuster.



FIG. 3329.—Bozeman's Button Adjuster.



GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

Bozeman's Button Suture.

"The button suture may be usefully employed in vesico-vaginal fistulæ, as it serves to support the edges of the fissure and prevent undue traction. The first suture should be introduced at the centre of the fistula, the distance at which the needle is entered from its anterior edge being not less than one-third of an inch, as the object is to obtain a very firm hold. The needle, pushed steadily on, is brought out of the sub-mucous connective tissue of the bladder (counterpressure being made against its advancing point with a pair of forceps, or the hook represented by Fig. 3318). It is then carried across the fissure, and entered at the posterior edge, which it traverses in a similar manner as the anterior. Thus suture after suture is introduced, until the number is completed, the interval between each two being about three-sixteenths of an inch, as exhibited in Fig. 3325.

"The closure of the fistula and the arrangement of the wire suture is done with the aid of the wire adjuster, Fig. 3328. This consists of a strong rod, curved in the shaft and set into a handle, its distal extremity being perforated and somewhat bulbous.

"*Modus Operandi.*—The opposite ends of each wire are passed through the opening in the adjuster, and firmly held between the forefinger and thumb of the left hand, when the instrument is carefully slipped down and well pressed against the parts in order to approximate the edges of the opening; when this is accomplished the adjuster is withdrawn. A button of suitable size and shape having been selected, is now passed over the wires, its concave surface corresponding to the vesico-vaginal septum, with which it is brought in close contact by means of the instrument represented in Fig. 3329, the angular and scalloped extremity of which admirably adapts it for that object. A perforated shot or a small piece of lead is then slipped down over the approximated ends of each suture and pressed firmly against the convex surface of the button by means of a pair of forceps. Finally, the operation is completed by clipping off the wires close to the crochet (or shot) and turning down their short ends; this keeps the button in place and the edges of the wound thoroughly united. Certain modifications of this operation are frequently necessary, growing out of the peculiar situation of the fistule or the condition of the parts. Thus, as Dr. Bozeman has pointed out, in the urethro-vaginal lesion the button must be rather long in the antero-posterior direction, very concave, and extended well forward in front of the urinary meatus, so as to support the catheter, its extremity being somewhat notched. The edges of the opening are brought together transversely; and the catheter, a gum elastic one, is introduced before the sutures are adjusted, retention being maintained, if possible, until the cure is completed. In fistules involving the vesical trigone and the root of the urethra, or of the trigone and bas-fond, or of all these parts together, in which the anterior border of the opening is immovably fixed to the pubic arch, with the concavity presenting backwards, the button requires to be bent upon its convexity."—"System of Surgery." Gross. 1882.

Removal of the Wire Sutures after Cure of Fistulæ.

"The proper time for removing the sutures is between the seventh and tenth days.

FIG. 3330.—Tucker's Wire Cutter.

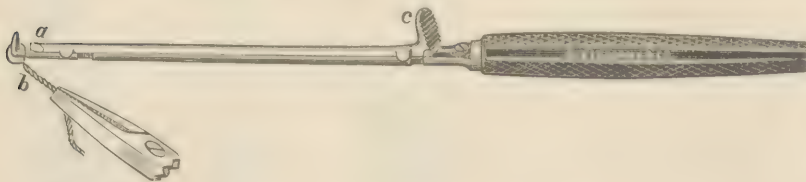
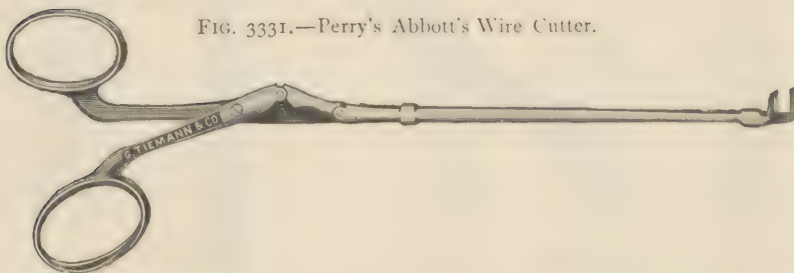


FIG. 3331.—Perry's Abbott's Wire Cutter.



They are removed by gently elevating each one in turn with the forceps and clipping the nearest side of the loop, so that, as they are withdrawn, they will continue to bind the parts until cleared."—Emmet's "Principles and Practice of Gynæcology."

"In from eight to fourteen days the sutures should be removed. To accomplish the removal of the sutures, the twisted end of one of them should be seized by a pair of forceps and drawn upon gently until the edge of the loop emerges from the tissue in which it has been embedded. Then the blade of a pair of scissors

should be inserted into the loop and one side cut, after which a little traction will remove the suture."—"Thomas, on the "Diseases of Women." 1880.

GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

Simon's Operation.

"No one, with the exception of Marion Sims, has labored more earnestly or achieved more for this operation than Prof. Gustav Simon of Heidelberg. Succeeding Dieffenbach, Wutzer and Metzler, who had themselves accomplished a great deal in advancing the interests of the operation by suture, he steadily labored with the means at his command, and, even before he became acquainted with the improvements made by Sims, had acquired a great degree of skill in treating vesico-vaginal fistulæ. To regard him as an imitator would be unjust; he was, without question, a coincident discoverer. The chief features in Simon's operation are these:

- "1. He repudiates silver wire as a suture superior to silk.
- "2. He employs an exaggerated lithotomy position in place of the left lateral position.
- "3. Instead of avoiding the mucous membrane of the bladder, he intentionally involves it in his abrasion.
- "4. He uses no stationary catheter, and has the urine drawn only during the first twenty-four hours, and this not always.
- "5. He allows the bowels to be evacuated whenever nature prompts it, and does not diet the patient nor confine her to bed. At times he even permits out-door exercise in twenty-four hours after the operation in favorable cases."—Thomas, "On Diseases of Women." 1880.

POSITION OF PATIENT.

"There are three positions in general use for the patient in operations for vesico-vaginal fistula: 1. The back, as in operation for stone; 2. The knee-elbow; and, 3. Sims' position, which is a modification of the latter. I use neither of these, but prefer the breech-back position (Steiss-Rückenlage), which has all the advantages of those mentioned, without their disadvantages. It consists in this, that the patient, lying on her back, is put in a position which is almost exactly similar to the knee-elbow position. The breech is so elevated that it is somewhat above the level of the abdomen and breast. The thighs are bent back towards the belly and the sides of the chest, so that the breech is the most projecting part. The legs are either flexed at the knee or extended over the sides of the chest. The vulva is above and to the front. The head is supported by a pillow. If the fistula is seated very high in the vagina the thigh must be drawn as far as possible upwards; if the fistula is, however, very near the vaginal outlet, we are not obliged to elevate the breech so much, and have no need, therefore, of flexing the thigh so forcibly. I have called this, in distinction to the ordinary back position, the 'Steiss-Rückenlage;' because in it the breech (Steiss) is the most projecting part, and presents itself in a manner very similar to the breech presentation of the fœtus. The advantages are:

- "1. The field of operation is clear; we are not obliged to operate between the thighs.
 - "2. The assistance can be all given from the side, without hindering the operator.
 - "3. It allows the use of several specula and the side retractors, to expand the vagina on every side.
 - "4. It is quite as well borne as the ordinary back position.
 - "5. It admits of chloroform narcosis.
- "If the fistula can be brought down entirely with perfect ease, I bring it directly to light. If, however, there is the least difficulty in moving it (as in the majority of cases), I operate with the specula and retractors, with the fistula *in situ*. I always prove this by seizing the uterus with a hooked forceps (Museux) and pulling it gently down, before I operate with the specula and levers. I have improved Jobert's method of seizing the cervix with the forceps by passing two threads through the cervix, thus getting rid of an instrument which is very much in the way.
- "Sims has constructed a gutter-shaped speculum for expanding the fistula, which has left all other specula in the background. He used four sizes.
- "I have found the use of this speculum in many difficult cases absolutely insufficient, and, in the majority of cases, it only answers the purpose by the aid of other instruments to expand the vagina. I use, therefore, not this speculum alone, but also a flat-shaped speculum to hold up the other vaginal wall and also side levers (shaped like retractors), to hold back the labia and sides of the vagina. All these instruments are fixed in long handles, curved at the end, in order to get them out of the way and to give the assistant a firm grasp. Always use the widest specula possible; Sims are not wide enough. I have had two sizes more made.
- "In addition to these I often use long-handled hooks to seize the edges of the fistula. I always cut the cord-like contractions of the vagina, and have even cut vaginal folds which were in the way.

VIVIFYING THE EDGES.

"All operators have tried to give a large surface for union without enlarging the wound. They have done this by cutting at the expense of the vagina, leaving the edges of the bladder intact. According to my observations and experience, I give the preference to a deep funnel-shaped incision of the edges of the fistula, similar to the incision in plastic operations in any other part of the body. The incision must be carried to the healthy tissue and all the cicatricial tissue extirpated. It extends quite through the walls of the septum to the vaginal mucous membrane, and sometimes through it.

GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

Simon's Operation. (Continued.)

"In this way is formed a steep, funnel-shaped wound, with its point in the bladder and its base in the vagina, and its edges from six to eight millimetres thick. Although other authors wish to avoid as much as possible the enlarging of this defect, it is exactly here only, where union can take place by first intention, that I strive to have the edges as free from cicatricial substance and as prone to union as possible; and, even in the largest fistula, I do not refrain from this repeated paring off the edges, even to making the defect very much larger, until the union is accomplished. And, even if with the best preparation of the edges, the union does not take place, and we meet with entire want of success, the woman loses no more urine than before.

"Sometimes I cut the vesical mucous membrane and sometimes avoid it, but place little weight on that.

"The advantages claimed are:

"1. By the deep funnel-shaped incision all cicatricial substance will be certainly cleared away.

"2. The edges are more prone to union, as they unite in a natural manner, edge to edge, and not with a flat surface on the same; the nerves, vessels, &c., thus continue on in the normal direction.

"3. The very wide edge is unnecessary, as only the upper edges unite in any case.

"4. If union does not take place the first time, a second attempt is more likely to succeed with the thick edges than where, with already thin edges, these must be bevelled off still more and made thinner.

"5. The idea that catarrh is more likely to follow this form of incision is unfounded.

UNITING THE EDGES OF THE WOUND.

"*Method of Uniting.*—There have been a great number of methods of bringing the edges together; all of which accomplish their purpose, but are more complicated than the method I published in 1854, which, with some modification, I have used ever since. In order to meet the indication for uniting, I use either one or two rows of fine silk sutures tied in the ordinary manner. In large fistulæ, where a great degree of relaxation is necessary in order to bring the edges into exact union, I use my so-called double suture, consisting of two rows, one the 'relaxing,' the other the 'uniting.' In small or slit-shaped fistulæ I use only one, the uniting row. In the double suture, one row, placed very deep and wide, approaches the tissues surrounding the fistula, to the line of union, thus relaxing the edges; while the other, placed between the stitches of the first, holds firmly the edges and thus promotes the most exact union. When only one is used it is the uniting row, and placed in the same manner as here described. Of course, each row of sutures supplements the other in its action.

"Both rows are placed very deep, even, in many cases, through the vesical mucous membrane. They thus bring the edges of the wound, in their whole thickness, in the closest union, and withstand greater traction than if they only seized a part of the edges. The sutures are one and one-half lines apart. The point of entrance of the threads is, in the relaxing suture, some distance from the edge; in the uniting, quite near. I consider it of little importance whether the suture goes through the vesical mucous membrane or not. It is only necessary to be careful that this membrane does not get between the edges of the wound.

AFTER TREATMENT.

"1. From a series of observations I conclude that neither on the wound nor on the new cicatrix does the urine have any injurious influence, and neither hinders the union by primary intention nor loosens a once formed cicatrix.

"2. From another series of observations I have learned that the healing is not interfered with by a degree of distention, which could come in a normal filling of the bladder, provided, only, that the wound is perfectly freshened and united. In most cases the permanent retention of the catheter only does harm. Each of these deductions is drawn from a number of appropriate cases.

"Upon these conclusions, then, is based my after treatment, which, up to the removal of the stitches, is entirely unimportant. Those minute directions, the carrying out of which is so tedious both for the patient and physician, are all laid aside. The patient is permitted to take any position she chooses. She passes her water as soon as she feels the need, either in a bed-pan, or, if she objects to that, in the sitting or knee-elbow position. Only in a few cases, where the patient is not in a condition to pass water spontaneously, is the catheter used every three or four hours. On the fourth or fifth day an attempt is made to remove the stitches, and this is repeated on the following days. On the eighth day, the patient is allowed to leave her bed, even if all the stitches are not out.

"To avoid passages from the bowels, with straining, on the first eight days, a fluid discharge is recommended. If irritation of the bladder ensue, morphine, one-eighth grain per dose, should be given, and daily warm injections into the vagina, but not into the bladder, should be employed."*

* This résumé has been prepared from Prof. Simon's work, published in 1862 by Dr. M. D. Mann. Copied from "Practical Treatise on the Diseases of Women," by F. Gaillard Thomas, M. D. 1880.

GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA.

Simon's Specula and Retractors.

FIG. 3332.—4 Simon-Bozeman's Specula.
4 Simon-Sims' Gutter-shaped Specula.
2 Simon's Socket Handles.

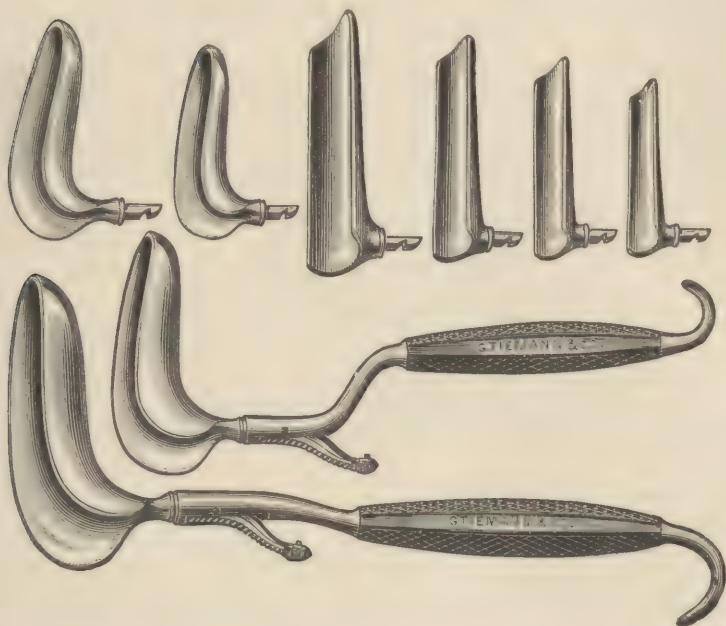


FIG. 3333.—8 Simon's Flat-shaped Specula.
2 Simon's Socket Handles.

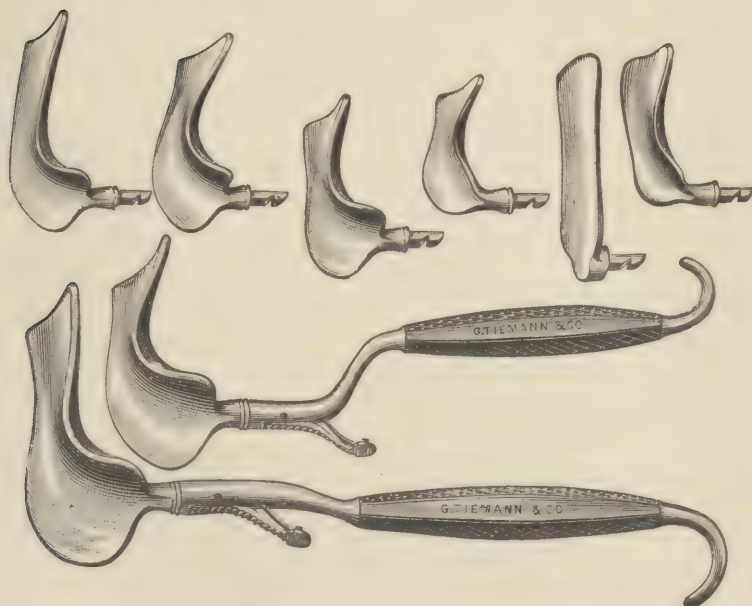


FIG. 3334.—Simon's
Serrated Retractors or
Side Levers.



FIG. 3335.—Simon's
Plain Retractor or Side
Lever.



GYNÆCOLOGICAL.

VESICO-VAGINAL FISTULA OPERATING CASES.

Sims' Set of Instruments for Vesico-Vaginal Fistula.

\$55.

- 2 Silver Sigmoid Catheters.
- 2 Metal Sigmoid Catheters.
- 1 Sims' Speculum, plated.
- 1 pair of Sims' Needle Forceps.
- 1 pair of Straight Long-Handled Scissors.
- 1 pair of Curved Long-Handled Scissors.
- 1 pair of Small Smooth-pointed Scissors.
- 1 pair of Twisting Forceps, slide-catch.
- 1 pair of Seizing Forceps.
- 2 Sims' Scalpels.
- 2 Sims' Tenacula.
- 1 Sims' Blunt Hook.
- 1 Sims' Suture Carrier.
- 1 Sims' Wire Adjuster.
- 6 Sims' Needles.
- 1 Coil Silver Wire.
- 2 Sponge Holders.
- Some Lead Wire.
- 1 Mahogany, Rosewood or Morocco-covered Case, lined with oil-dyed velvet.

Bozeman's Set of Instruments for Vesico-Vaginal Fistula.

\$100.

- 2 pairs of Bozeman's Scissors, right and left.
- 1 pair of Stout Straight Scissors.
- 1 pair of Scissors, curved on the flat.
- 1 pair of Shot-smashing Forceps.
- 1 Perforating Awl.
- 1 pair of Self-Closing Seizing Forceps.
- 1 pair of Curved Forceps, lined with copper on the points, for holding and drawing wire sutures.
- 1 Bozeman's Clamp or Button Adjuster.
- 1 Bozeman's Wire Adjuster.
- 1 Fork Pulley.
- 1 Long Steel Probe in Ebony Handle.
- 1 Blunt Hook.
- 2 Tenacula.
- 2 Straight Scalpels.
- 2 Angular Scalpels, right and left.
- 1 Urethra Depressor.
- 1 Curved and 1 Straight Needle-Holder, both to fit one handle.
- 1 pair of Shot-Perforating Forceps.
- 1 pair of Plain Forceps, with 1 extra point.
- 3 Metal Sigmoid Catheters (Bozeman's).
- 5 Sizes of Silver Buttons.
- 2 Swan-Bill Speculums, four sizes.
- 3 Coils of Silver Suture Wire and some Silk
- 1 Common Probang.
- 2 Sponge Holders.
- 12 Assorted Needles (Bozeman's).
- 1 Rosewood Case, lined with oil-dyed velvet.

Sims' Set of Instruments for Vesico-Vaginal Fistula and Uterine Operations.

\$75.

- 1 Sims' Speculum.
- 1 Depressor.
- 1 Silver Caustic Probe.
- 1 Simpson's Sound.
- 2 Sponge Holders.
- 1 pair of Sims' Twisting Forceps.
- 1 pair of Sims' Seizing Forceps.
- 1 pair of Scissors, curved to the right side.
- 1 pair of Scissors, curved to the left side.
- 1 pair of Sims' Needle Forceps.
- 1 pair of Straight Scissors.
- 1 Sims' Revolving Knife.
- 1 Sims' Wire Adjuster.
- 1 Sims' Suture Carrier.
- 1 Sims' Uterine Repositor.
- 2 Sims' Scalpels.
- 2 Sims' Tenacula.
- 1 Sims' Blunt Hook.
- 1 Sims' Silver Sigmoid Catheter.
- 4 Metal Sigmoid Catheters.
- 4 Coils Silver Wire.
- 12 Sims' Needles.
- 1 Mahogany, Rosewood or Morocco-covered Case, lined with oil-dyed velvet.

Emmet's Set of Instruments for Vesico-Vaginal Fistula.

\$80.

- 1 Sims' Hospital Speculum.
- 1 Sims' Virgin Speculum.
- 1 Emmet's Depressor.
- 1 Emmet's Sponge Holder.
- 1 Sims' Catheter, soft metal.
- 1 Emmet's Uterotome.
- 2 Emmet's Tenacula.
- 1 Perry's Tenaculum.
- 6 Emmet's Scissors.
- 1 Emmet's Wire Pressing Forceps.
- 2 Bistouries.
- 1 Scalpel.
- 1 Emmet's Needle Forceps.
- 1 Emmet's Dressing Forceps.
- 1 Emmet's Wire Twisting Forceps.
- 1 Sims' Blunt Hook.
- 1 Sims' Shield.
- 1 Sims' Wire Carrier.
- 1 Coil Silver Wire.
- 1 doz. Emmet's Needles.

In a three-fold Morocco-case, lined with chamois—red or drab. In the middle compartment are placed the scissors and other instruments which would be injured by being twisted in the rolling or folding of the case. Beneath these is space for the speculum and sponge holders.

GYNÆCOLOGICAL.

STONE IN THE FEMALE BLADDER.

Formation and Methods of Removal.

"Calculi have formed after a vesico-vaginal fistula had been closed—and more frequently after some operation about the neck of the uterus, and generally when laceration had occurred through the anterior lip into the base of the bladder. I have, in several instances, found the nucleus to be a small portion of wire which had dropped into the bladder as the end of some suture had been clipped. But, as a rule, I believe the nucleus is furnished by some denuded surface which has been turned into the bladder, or left there through a careless adjusting of the edges of the fistula.

"Dr. Henry F. Campbell, of Augusta, Ga., has offered a different explanation of the origin of calculi after the operation for vesico-vaginal fistula:* 'Reasoning then, from my own case, and from others in which calculi of considerable size have been found to exist in the bladder shortly after closing the fistula by operation, I conclude: 1st. That in such cases the stone exists previous to the fistula, perhaps *causing* the slough during the labor in which it occurs; 2d. That they are grasped by the empty bladder and remain imbedded during the entire period of the existence of the fistula; and, 3d. That when the fistula has been closed by operation and the collection of urine in the bladder becomes again possible, the consequent distention releases the stone. The calculus is not, therefore, in process of formation in the bladder at that time, but is only *discovered* after the close of the fistula.'

"The explanation is original, and I have no doubt is a correct one for a number of cases. I can recall several instances in my own experience where I was unable to offer to myself any explanation for so rapid a development of stone within a few weeks after closing the fistula. But, on the other hand, I have known of several cases where the loss of tissue had been too great, and too large a portion of the bladder had been constantly inverted, for a stone to have any lodgment. I acknowledge the importance of Dr. Campbell's explanation, and the consequent necessity for passing the finger into the interior of every bladder before closing it. But I am equally certain that an undenuded surface left in the bladder will furnish a starting-point and that a stone may be developed within a short time after closing the fistula.

Stone Searchers, Sounds.

"The symptoms of stone resemble closely those of cystitis, and, unless a steel sound is passed into the bladder, the differentiation will not be easy. This is best done while the patient lies on the back, with her limbs flexed on the abdomen and held by an assistant on each side. The administration of ether is generally necessary, and it is well to moderately distend the bladder with tepid water before attempting the examination. (See page 400.)

Lithotritry.

"There are two methods by which a stone may be removed from the bladder: through the urethra, or through an opening made in the base of the bladder from the vagina. When the stone is soft and of moderate size, it may be readily crushed by a lithotrite, and, if it is thoroughly broken up, the débris will readily pass through the urethra. As a woman, in comparison with a man, is little liable to inflammation, the stone should be repeatedly and thoroughly crushed and it should be accomplished at a single sitting. * * * Dr. Henry J. Bigelow, of Boston, has devised an excellent method for crushing stone in the male bladder and for removing the fragments, which it appears is even more applicable in the female."

See "LITHOLAPAXY," page 406.

Lithotomy.

"When the coats of the bladder have become thickened and marked cystitis exists, the proper course is to extract the stone through an artificial opening in the vesico-vaginal septum. A stone by this means can be safely removed by one who may not possess the dexterity to crush it properly. It is the operation *par excellence* when the bladder has become so diseased that absolute rest is required, and rest is to be obtained only by allowing the urine to escape as rapidly as it enters the bladder. The operation does not differ essentially from that described for the relief of cystitis by opening the base of the bladder.† After the stone has been removed the patient should be turned on the back, placed over a bed-pan, the nozzle of the syringe introduced through the urethra and the bladder thoroughly washed out, while the sides of the fistula are kept apart by the index finger in the vagina. After removal of the stone, the opening is closed in the same manner as for vesico-vaginal fistula generally, and it should be done immediately, unless the mucous membrane is found to be in a diseased condition. In this event, the case must be treated as if it were one of cystitis and the opening left for the free escape of urine until the parts, by rest, gradually recover their tone."

"Principles and Practice of Gynæcology." Emmet. 1884.

"*Vesico-Vaginal Lithotomy.*—Rousset, who first performed this operation, made an incision some thirteen or fourteen lines in length, in the septum which lies between the vagina and the bladder."—"Bernhard and Huette's Manual of Operative Surgery." Van Buren and Isaacs. Am. Ed. 1857.

* "Origin and History of Calculi found in the Bladder, after the Cure of Vesico-vaginal Fistula by Operation." "American Gynæcological Transactions." Vol. I. 1876.

† See "KOLPO-CYSTOTOMY," page 464.

GYNÆCOLOGICAL.

KOLPO-CYSTOTOMY.

Artificial Vesico-Vaginal Fistula for the Cure of Cystitis.

Emmet's Method.—"The operation is in itself a simple one, and, if resorted to before the disease has advanced so far as to involve the kidneys, is as free from risk as any other in minor surgery. Even under the most unfavorable circumstances the risk of the operation is justifiable, for by it life may be prolonged and a great degree of comfort obtained in allaying the persistent efforts to empty the bladder.

"The operation is to be performed under the influence of an anæsthetic when possible, with the patient on the left side and the anterior wall of the vagina fully exposed by means of a large-sized Sims' speculum. A sound, somewhat abruptly curved an inch and a half from its extremity, must be introduced into the bladder and held by an assistant. While the point of this instrument is firmly pressed in the median line against the base of the bladder, a little behind the neck, the projecting tissue on the vaginal surface must be seized with a tenaculum and divided by a pair of scissors directly on the point of the sound until it can be passed through into the vagina. With the sound remaining in the opening as a guide, one blade of a pair of scissors should be passed into the bladder, and the vesico-vaginal septum be divided backwards in the median line. By this mode, especially where the vagina is of a natural size, the operation is extremely simple, and is completed in a few moments. The object in cutting on the point of the sound is, to be sure that the bladder and vaginal surface are divided in corresponding incisions, for there is so much mobility of one surface over the other that it is exceedingly difficult to enter the bladder unless the parts are transfixed.

FIG. 3336.—Harris' Counter-pressure Staff.



"Dr. P. A. Harris, of Paterson, N. J., has devised an instrument for entering the bladder, which renders the operation safe and easy of execution. His description is as follows: 'A fenestrated staff, shaped as shown in the illustration (Fig. 3336), is passed through the urethra into the bladder. The convex surface of the fenestrated portion of the staff is then pressed firmly against that point in the median line which may be selected for the opening. While the vesico-vaginal tissues are thus stretched with a degree of tension, a tenaculum is thrust through all into the bladder. The tenaculum is then rotated half-way round, and its point brought out at a distance of about one-quarter of an inch directly posterior to that of its introduction. The staff having served its purpose, that of counterpressure, while transfixing the tissues with the tenaculum, is now withdrawn. The point for the opening, being still firmly held by the tenaculum in the left hand, is divided by one sweep of the heavy curved scissors in the right hand. A little practice will enable the operator to quickly make either a round or oval opening at will.'"—"An Improved Method of Cutting the Vesico-Vaginal Fistula for the Cure of Chronic Cystitis." *American Journal of Obstetrics*. New York, March, 1883.

"The mode of operating, as described, can be but little improved upon as to simplicity. The median line has been preferred for the location of the incisions, since it is not likely to include any large blood-vessels, unless the opening is extended too near to the cervix uteri or to the neck of the bladder. In theory there is no necessity for an opening larger than that equal to the area of the two ureters; in practice, however, it is found that it must be greater at first than this, from the fact that, in spite of all the care that can be taken to prevent it, a large portion of it will close too soon. Moreover, at first, it is a great advantage to have an ample opening through which the accumulated mucus in the bladder may be easily washed out. It is very seldom that much bleeding follows this operation unless, as just stated, the incision is extended too far in either direction. When a large vessel has been divided, it will either be a branch of the circular artery of the cervix uteri or one given off from the sub-public artery. Bleeding in either direction is readily arrested by introducing a silver suture, so as to include a fair amount of tissue beyond the angle of the wound, and twisting it sufficiently tight. The suture must, of course, be bent flat, so that it shall not be an additional source of irritation.

FIG. 3337.
Emmet's
Cystitis Eyelet.

"Formerly, it was necessary to force the finger through the artificial opening once or twice a day, to keep it open, and even with the greatest care it would sometimes close if the edges were kept in a healthy condition by the hot water injection. I devised a hollow glass stud or eyelet (Fig. 3337), which was buttoned into the incision, and this answered reasonably well under the circumstances. But the different devices for retarding the healing, and the daily use of the finger to break up the union, added greatly to the suffering of the patient, and very often this additional irritation, for the

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KOLPO-CYSTOTOMY.

Artificial Vesico-Vaginal Fistula for the Cure of Cystitis. (Continued.)

time, at least, greatly increased the cystitis. The suffering of the patient was aggravated by the phosphatic deposit which took place from the urine over the raw surfaces. This arrested cicatrization of the sides of the fistula, so that it was necessary to pick it off, and this was a slow and painful process, to be followed by the application of a solution of nitrate of silver to protect the surfaces. After making the buttonhole opening into the urethra, where the

FIG. 3338.—Bache Emmet's Fistula Tube.



necessity for uniting the two mucous surfaces was at once made evident, I applied the same plan to the opening for cystitis, using in the same manner interrupted carbolized silk sutures. The lining membrane of the bladder is as loosely attached as that of the urethra, and can be as readily drawn out. By uniting these mucous surfaces the bladder membrane is rolled out into the vagina, so that the raw edges of the fistula become perfectly protected from the action of the urine. These surfaces soon unite, and the artificial opening remains patulous afterwards. By this simple method the fistula can now be kept

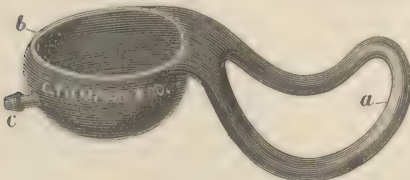
open indefinitely and it has rendered the operation now perfect."—"Principles and Practice of Gynæcology." Emmet.

Bozeman's Method.—"Dr. Bozeman recommends the cutting out of a circular piece, and the plan is a good one, for the opening could then never entirely close of itself. But the size of the piece as recommended by him is too large for any but an expert to remove. The general operator must bear in recollection the anatomy of the parts and remove but a moderate sized portion, or he will be apt to include the mouths of both ureters and the neck of the bladder, and to open laterally into the large bloodvessels running along the vagina, outside of the bladder."—"Principles and Practice of Gynæcology." Emmet. 1884.

Pallen's Method.—Prof. Pallen recommends opening into the bladder with the Paquelin thermo-cautery (page 39) as follows: "The main difficulty hitherto has been to keep the incision open after the use of the scissors or knife. Artificial means must be resorted to, such as an india-rubber tube passed from the urethra through the opening, which is annoying and painful, or a glass button introduced, which is difficult to retain, and when retained is apt to beget vesical tenesmus. I believe the use of the actual cautery at a red heat will be found to answer all purposes. If the platinum tip of the cautery be heated to a white heat, it cuts through as rapidly as the knife, and, therefore, hæmorrhage is to be expected. Besides, the thin slough produced by white heat might peel off and union ensue. To avoid both bleeding and contraction, the tip should be raised to a red heat only and passed slowly along the site of the proposed opening, dividing first the mucous membrane of the vagina, and then held still for a moment or so to allow the adjacent vessels to contract and become occluded. The submucous connective tissue is then burned and afterwards the bladder itself. Extreme delicacy of manipulation is required upon the part of the surgeon, lest he burn directly into the cavity of the bladder, which should be avoided in order to prevent hæmorrhage, contraction and subsequent union."—"Kolpo-Cystotomy; or, Artificial Vesico-Vaginal Fistula." By Montrose A. Pallen, A.M., M.D. *American Journal of Obstetrics*. Vol. XI. April, 1878.

"The care, after an operation of this kind, consists in daily cleansing the bladder thoroughly with demulcent warm fluids, such as starch or flaxseed water. The pain in the bladder, following the burning, is comparatively slight, and usually subsides within thirty-six or forty-eight hours."

FIG. 3339.—Skene's Urinal Cup Pessary.



to it, the urine can be conveyed into a vessel. When the introitus vulvæ is small and the sphincter vaginæ perfect, this answers very well, especially during the night, when the patient is in the horizontal position. When worn during the day, it is necessary to have a rubber bag attached to the leg of the patient, to act as a receptacle. Encouraged by my success with the globe pessary, I had another made, shown in Fig. 3339. It is the ordinary Smith's pessary, with an oblong cup on the upper anterior portion of it, which fits over the fistula and collects the urine and guides it out to a urinal. In artificial fistula, made in the centre of the vagina, this pessary answers a most valuable purpose."

"Diseases of the Bladder and Urethra in Women." Alexander J. C. Skene, M. D.

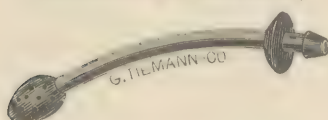
"An objection to cystotomy is that, while the patient is relieved from pain, she is made distressingly uncomfortable by the constant trickling of urine from the fistula. I tried to obviate this trouble to some extent by using a hollow globe pessary, made of hard rubber, with a tube attached to it. The globe is numerously perforated with small holes all around, except for about half an inch from where the tube begins. The globe is introduced into the vagina and the tube projects through the introitus. The urine collects in the globe and escapes through the tube; and, by attaching a piece of flexible tubing

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URETHRAL AND URO-CYSTIC.

Drainage of the Female Bladder in Cystitis.

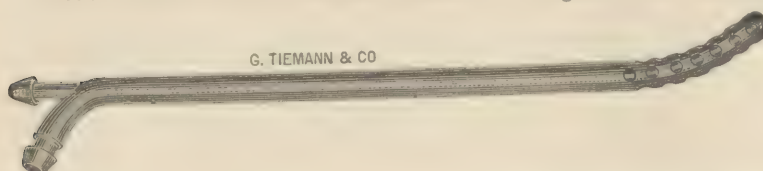
FIG. 3340.
Skene's Self-Retaining Catheter.
(Modification of Goodman's.)



over which an india-rubber tube may be slipped; this being inserted into a bottle at night, or into a urinal when the patient is up, her person may thus be kept perfectly clean."—SKENE.

"This catheter, devised originally for treatment in vesico-vaginal fistula, is a good one for the purpose of draining the bladder in cystitis. Dr. Skene had the point made larger and more rounded, and finds that it answers well and is easier to introduce than the original. It is self-retaining in all positions of the patient; first, by reason of the bulb at its upper extremity, which passes beyond the urethra into the bladder; secondly, on account of its curved shape; and, thirdly, in consequence of the button being overlapped and grasped, as it were, by the vulva. At the lower end there is a slight projection or knob,

FIG. 3341.—Skene's Double Perforated Catheter for Irrigation of the Bladder.

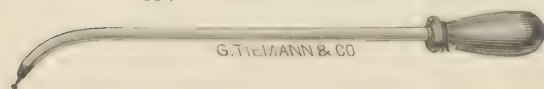


being much larger, a great quantity of fluid can be passed into and through the bladder without distending it. By means of rubber tubing attached to the escape nozzle the fluid may be conveyed to a receiving vessel. By compressing the escape tube with the thumb and finger, a stop-cock effect can be produced, and the fluid retained in the bladder for any desired length of time and then permitted to escape fast or slowly, at the will of the operator."—SKENE. (See also page 388.)

"It is made of hard rubber and perforated with small openings at the point, and bifurcated at the end. A small tube runs from one of the bifurcations to the extreme point. This is the supply tube, which is connected by means of rubber tubing with the syringe. The escape tube

Local Applications to the Bladder.

FIG. 3342.—Skene's Instillation Tube.



point is introduced into the solution to be used; the bulb is compressed by the thumb and finger and then relaxed, which draws up the desired amount. The tube is then carried into the bladder, and, by again compressing the bulb, the fluid is easily deposited in the organ."—"Diseases of the Bladder and Urethra in Women." Alexander J. C. Skene, M. D.

"My favorite method of making such applications (nitrate of silver in solution) to the interior of the bladder is by *instillation*, as it is called. I take a glass tube of the size and shape of No. 8 or 9 sound, with a small rubber bulb attached to the straight end. The curved

For Inspection, Exploration and Dilatation of the Urethra.

FIG. 3343.—Emmet's Urethral Buttonhole Scissors.



dexterity. It is necessary to administer an anæsthetic for the operation and then place the patient on the left side, using a moderate-sized Sims' speculum to bring into view the vaginal surface covering the urethral tract. An instrument has been devised by me for making an opening into the urethra. It is formed somewhat on the principle of the scissors used for cutting a buttonhole, with the exception that the portion entering the urethra is made round and like the extremity of a large-sized uterine sound. The vaginal blade has a portion removed, so as to begin the incision about a quarter of an inch from the urethral entrance, from which point the opening is to be extended, in the median line, nearly to the neck of the bladder. This instrument answers the purpose admirably."—"Principles and Practice of Gynecology." Emmet. 1884.

"It is now some six years since I first devised the plan of making a buttonhole-like opening in the female urethra for the purpose of forming a diagnosis, or for facilitating any operative procedure. I do not now hesitate to announce the fact that the method I shall now describe for exploring the female urethra is the only one within our knowledge to-day which fulfils every indication, is safe, simple, and within the scope of any one possessing the least degree of surgical

GYNÆCOLOGICAL.

URETHRAL AND URO-CYSTIC.

For Inspection, Exploration and Dilatation of the Urethra.

FIG. 3344.—Stein's Female Urethral Speculum or Dilator.

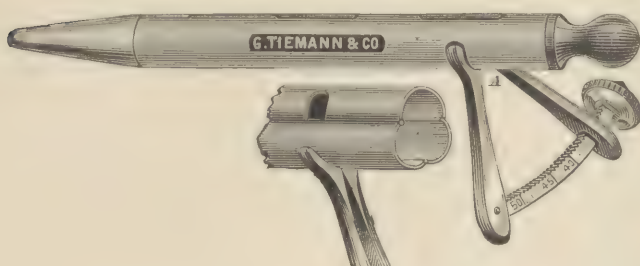
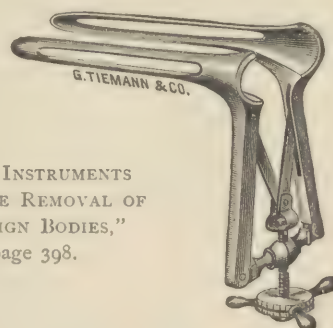
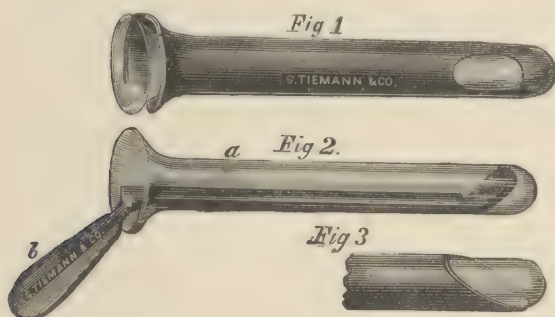


FIG. 3345.
Sampson's Urethral Speculum.



See "INSTRUMENTS
FOR THE REMOVAL OF
FOREIGN BODIES,"
page 398.

FIG. 3346.—Skene's Urethral Endoscope.



"Rapid dilatation of the urethra is chiefly useful for the purpose of allowing the extraction of foreign bodies and moderate sized calculi; for cauterizing the mucous membrane; opening hæmatoceles, allowing the introduction of endoscopic tubes of large size, and with them diagnosing cystitis, calculi, ulceration, vesico-intestinal fistulæ, polypi, papilloma, &c., and for the local treatment of these."—"Diseases of the Bladder and Urethra in Women." Skene.

"Skene's endoscope, for physical exploration of the urethra and bladder, is composed of three parts: 1st. A glass tube (2) in shape like the ordinary test tube used by chemists. 2d. A mirror and handle, *b*,

which holds it. A piece of very thin silver plate is made to fit nearly the whole length of the inside of the glass tube, and about one-third its circumference, to one end of which the mirror is attached, at an angle of about one hundred degrees; the delicate handle at the other end projects at an obtuse angle. This piece is blackened inside, and, when placed in position for use, darkens one side of the glass tube. 3d. A fenestrated hard rubber speculum, open and beveled at the end. These specula are used in making applications to the urethra and bladder. The method of using this instrument is as follows: The tube, with the mirror inside, is introduced into the urethra, and bladder also, if an examination of the latter is desired. Light is then thrown into the tube by aid of a concave mirror; and, by moving the mirror backward and forward, the whole of the parts to be examined are brought to view in regular succession. With this simple instrument I can accomplish all that is to be desired." (See also page 343.)

URETHRAL TUMORS.

Cysts, Condylomata, Mucous Polypi and Fibroma.

"The treatment of these cases is, in most instances, entirely surgical, but when the general system is deranged it should receive careful attention. The local treatment recommended by the various authors differs widely, but has the same end in view, viz.: the destruction or removal of the abnormal growth. The various methods employed are ligation, torsion, excision by the knife, scissors, *curette*, *écraseur*, galvano-cautery, caustic and electrolysis. Either of these methods may be made to answer in all cases, but a judicious selection, according to the location and the nature of the neoplasm, is advisable. A combination of means is best at times: say, excision by the scissors and cauterization afterwards. Whatever method you choose, you will first place your patient in the lithotomy position, or in Sims' position, on the left side, which I prefer, and by a speculum expose the part to be removed.

FIG. 3347.—Skene's Urethral Speculum.



"There are two instruments which I use for this purpose. The first is shown, Fig. 3347. It is made on the principle of Sims' speculum vaginae, the ends being of different sizes. An elevator is attached at the central portion between the blades, and so arranged that when it is closed on one blade it is thrown out from the other. The elevator is pressed down on the blade

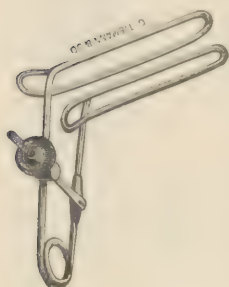
GYNÆCOLOGICAL.

URETHRAL TUMORS.

Cysts, Condylomata, Mucous Polypi and Fibroma. (Continued.)

and the instrument introduced, and then by pressing on the other end of the elevator the urethra is distended to its full natural capacity. When it is necessary to expose one side of the urethra completely, the elevator should be removed and the instrument used in the same way that we employ Sims' speculum in examining the vagina. The

FIG. 3348.
Skene's Folsom's
Speculum.



other instrument is a modification of Folsom's nasal speculum. By turning the nut of the screw the blades are closed and the instrument is introduced; by unscrewing the nut the elasticity of the spring coil throws the blades apart. This instrument answers well when the tumor to be removed is small and you are obliged to operate without assistance. It is self-retaining. The other speculum is preferable in most cases, but in operating through it you require some one to hold it for you.

"When the tumor is at or near the meatus and has a large base, or if it is vascular and you fear troublesome hæmorrhage, *removal by ligature* is preferable. Having exposed the part with the speculum, transfix the base of the tumor by passing a needle from without inwards, parallel to the axis of the urethra; pass your ligature around, under the needle, then grasps the tumor with a forceps and make traction, so as to bring the sides of the base within the grasp of your ligature, and then tie it slowly and as tight as you possibly can without cutting the tissues. * * If the base of the growth is too large to be included easily in one ligature, you can transfix with a needle armed with a double thread and tie its two halves. In choosing the material for a ligature, I would advise the use of

fine plaited silk, boiled in a mixture of beeswax, carbolic and salicylic acids. This ties easily, does not stick and jerk like the ordinary ligature; and, more than that, it does not slip. If the tumor is within easy reach, you can seize the pedicle with a small forceps, and, taking the tumor in a polypus forceps, *remove it by torsion*; or, you can *cut* it off with the knife or scissors, and if the pedicle inclines to bleed, touch it with caustic. You will find Allen's polypus forceps for the ear (Fig. 2066) the most convenient instrument for taking hold of these tumors. In cases where there are several small growths high up in the urethra, they can be removed with the *curette* (page 191), and, when the hæmorrhage has subsided, the base of each should be cauterized. But little difficulty will be experienced in operating in the various ways described when the neoplasms are low down in the urethra, where they can be easily seen and handled. When they are high up in the canal, then skill and care are required to remove them. In such cases you will succeed best with the *écraseur*, or the instrument known as Blakes' polypus snare, used for removing polypi from the ear (see Fig. 2064). It is simply a very delicate *écraseur*, the chain or wire of which is tightened by the finger in place of a screw. You will find that, instead of the wire commonly used, catgut is better; it is more pliable, yet stiff enough to be manageable. My friend, Dr. John W. S. Gouley, was the first to use this instrument for removing tumors of the urethra, and I can testify to its great value in such operations. In operating with the snare, the tumor is exposed with the urethral speculum; and, if the growth is pedunculated, the loop of catgut is passed over it and removal effected by constriction. When there is a broad base, the whole mass is seized with the polypus forceps and the snare is passed over it and tightened until it comes away. There is one accident that very often occurs in this operation, and that is breaking the wire or catgut. This takes place usually just when the tumor is almost cut off, and it annoys and hinders the operator, but does not spoil the operation, as a new piece of catgut can be used and the operation completed. You can often avoid this accident by taking time. The base of the pedicle of most of these growths will give way under long-continued pressure, but the wire or catgut will break if you hurry too much.

"In order to operate high up in the urethra, it is sometimes necessary to *dilate* the lower portion of it. A convenient way to do this is the following: Take a piece of fine rubber tubing and draw it over the blades of the Folsom speculum, and then introduce the instrument into the urethra. Open the blades and let it distend the urethra as far as it can. To produce the *extra dilatation*, take a series of graduated sounds or dilators and force one of these in between the blades of the speculum; remove that one and use a size larger, and so on until you obtain the requisite amount of dilatation. The blades of the speculum and the rubber tubing protect the mucous membrane of the urethra from injury in passing in the dilator. The danger of incontinence of urine, which is liable to follow from forcible dilatation, can be avoided by distending the lower portion of the urethra only.

"To obtain sufficient light for operating high up in the urethra, it is necessary to have clear sunlight; or, if that is not obtainable, gaslight should be used; and in either case the concave head mirror (see page 257) should be employed.

"Of late years the *galvano-cautery* has been very extensively used in surgery generally and has been recommended for the removal of urethral tumors.

"*Caustics* have been more extensively used than any other means of removing urethral neoplasms, and I know of no better way of destroying small growths. I prefer pure nitric acid, which I use as follows: Exposing the tumor with the speculum I wrap a little cotton around a probe and dip it into the acid, and apply it to the part to be destroyed, taking care not to touch any of the normal tissues.

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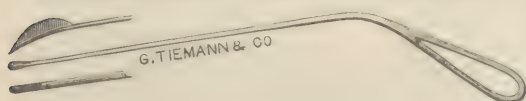
URETHRAL TUMORS.

Cysts, Condylomata, Mucous Polypi and Fibroma. (Continued.)

Electrolysis.—This means of treating abnormal growths has been employed so much lately that I need not detain you with any description of the *modus operandi*, but simply tell you that those tumors that recur, and those that you suspect to be malignant, and those also that are so high up in the urethra as to be difficult to remove, should be treated by electrolysis. Two long slender needles (page 36) should be insulated by coating them with collodion, except at the points. These are attached to the electrodes of a galvanic battery, and their points introduced into the base of the tumor and the current passed through until the whole of the abnormal tissue is decomposed. I prefer to use a current sufficiently strong to char the tumor and thereby completely destroy it. There is one rule which I would urge you to keep in mind in treating tumors of the urethra, and that is, to be sure to remove *all* the abnormal tissue. Whatever method you employ, do not leave any portion of that which ought to be removed. I am confident that much of the trouble experienced by these growths returning again and again might be avoided by a careful observance of this rule."

Vesico-Urethral Fissure.

FIG. 3349.—Skene's Fissure Probe and Knife.

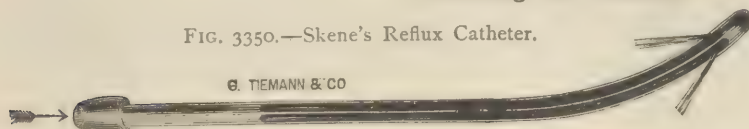


in the manner that surgeons treat the same disease of the anus, has been followed by great relief. For this operation I use the small knife as represented (Fig. 3349).

"I have used with benefit the *modified* stick of nitrate of silver. It consists of one part of nitrate of silver to two or three parts of the nitrate of potash. Drawing a fine point of this through the fissure causes sharp pain at the time, and is often followed by pain, burning, and tenesmus, which, however, soon subside. *Incising* the fissure

Douching the Urethra.

FIG. 3350.—Skene's Reflux Catheter.



ler of a crimping machine. Inside of the catheter is a small supply tube, which conveys the water to the point of the instrument to where the grooves terminate, each one of which is perforated to let the water flow out. By this arrangement the water, as it flows back through the grooves, is brought in contact with every portion of the mucous membrane. The instrument is passed up to the neck of the bladder and a fountain syringe attached to it, and the water as it flows away is caught in a cup."

"I have seen much benefit from douching the urethra with water as hot as the patient can bear it. For this purpose I use a catheter made like a fluted roller

Urethrocele; Dilatation of the Middle Third.—Dr. Bozeman has proposed making an opening into the most dependent part of the urethra, through the vaginal wall and maintaining it until all inflammation has been relieved, and then closing the opening by the usual plastic operation."

Stricture of the Urethra.

"The treatment of stricture will depend upon its location and cause. If it is situated at the meatus, it can be divided by the urethrotome, or forcibly stretched with the dilator. When due to bands of scar tissue in the vagina they should be divided at several points and the urethra dilated by repeatedly passing the sound. When it is owing to deposition of the products of inflammation in the submucous tissue, forcible and rapid dilatation, as practiced on the male subject (see instruments page 357), will answer well if you select the proper cases for this form of treatment. Remember, while operating in this way to make your dilatation carefully, with a view to breaking up the constricting tissue without lacerating the mucous membrane. To do this it is not necessary to dilate the urethra to any great extent. As soon as you feel that the stricture has given away, suspend your dilatation.

"Incising the stricture from within outward, according to the method commended by Otis for the cure of stricture in the male (see page 365), will no doubt answer a good purpose.

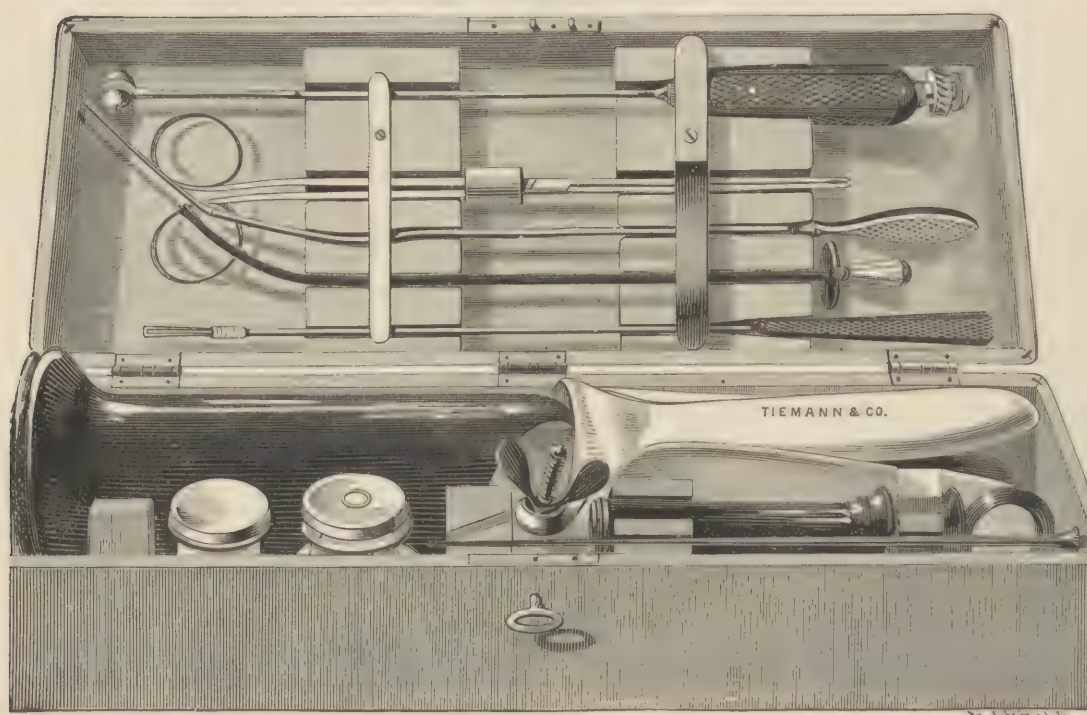
"In contraction of the whole urethra, arising from disuse in cases of vesico-vaginal fistula, gradual dilatation with graduated sounds (see page 353) answers very well. This should be attended to before closing the opening in the bladder. In all cases, attention should be given to any inflammation that may accompany the stricture or follow the treatment. It is well to keep such patients under observation, and pass the sound from time to time to see if there is any tendency for the stricture to return."—"Diseases of the Bladder and Urethra in Women." Alex. J. C. Skene, M.D.

See SKENE'S UROCYSTIC AND URETHRAL OPERATING SET, page 396.

GYNÆCOLOGICAL.

OPERATING AND DRESSING CASES.

FIG. 3351.—Gardner's Uterine Case.

**Gardner's Set of Uterine Instruments.**

\$46.

- 1 Gardner's Manifold Instrument.
- 1 pair of Caustic Forceps, gilt.
- 1 Uterine Sound.
- 1 Barker's Salve Bougie.
- 1 Sponge Holder.
- 1 Tiemann & Co.'s Quadrivalve Speculum.
- 1 Long Pipe Syringe.
- 2 Cylindrical Glass Specula.
- 2 Bottles for Oil, &c.
- 1 Rosewood or Mahogany Case, lined with oil-dyed velvet.

Sims' Set of Instruments for Uterine Surgery.

\$125.

- 1 Sims' Curette.
- 2 Sponge Holders.
- 1 pair McClintock's Polypus Forceps.
- 1 pair Sims' Polypus Forceps.
- 1 Sims' Porte-Chain Ecraseur.
- 1 Aveling's Polyptrite.
- 1 Simpson's Hysterotome.
- 1 pair of Curved Scissors.
- 1 Sims' Movable-Blade Knife.
- 1 Priestley's Dilator (or Ferguson's).
- 1 pair of Tenaculum Forceps.
- 1 Uterine Repositor.

- 1 Porte Tampon.
- 1 Forked Sound.
- 1 Vaginal Dilator.
- 1 Mahogany, Rosewood, or Morocco-covered Case, lined with oil-dyed velvet.

Peaslee's Set of Uterine Instruments.

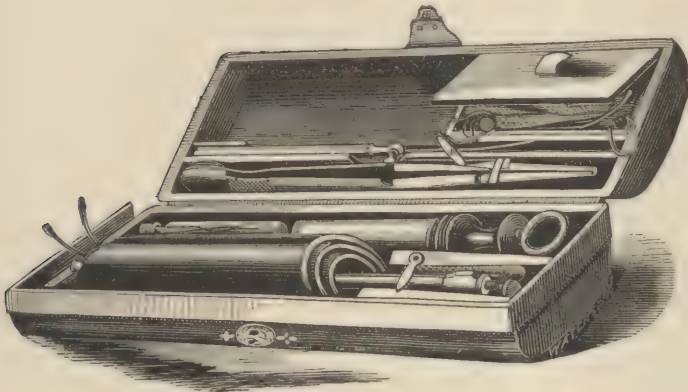
\$60.

- 1 Sims' Speculum.
- 1 pair of Speculum Forceps.
- 1 Uterine Tenaculum.
- 1 Peaslee's Sound.
- 1 Emmet's Applicator.
- 1 Peaslee's Metrotome.
- 1 pair of Curved Uterine Scissors.
- 1 Uterine Scarificator.
- 1 Tube for Intra-Uterine Applications.
- 1 Uterine Syringe.
- 1 Catheter.
- 1 Peaslee's Curved Needle.
- 1 Emmet's Needle.
- 1 pair of Needle Forceps.
- 2 Ferguson's Glass Specula.
- 1 Peaslee's Depressor.
- 1 Simpson's Sound.
- 1 Whalebone Probe.
- 1 Rosewood, Mahogany or Morocco-covered Case, lined with oil-dyed velvet.

GYNÆCOLOGICAL.

OPERATING AND DRESSING CASES.

FIG. 3352.



Buttles' Set of Uterine Instruments.

\$23.

- 2 Glass Specula.
 - 1 Hard Rubber Syringe.
 - 1 Handle to fit:
 - 1 Simpson's Sound.
 - 1 Flexible Silver Probe.
 - 1 Sims' Razor-shaped Knife.
 - 1 Sponge Holder.
 - 1 Cotton Expeller.
 - 1 Budd's Whalebone Probe.
 - 1 Scarifyer and Tenaculum.
 - 1 Phial to carry Caustic.
 - 1 Russet Leather Case.
- The same, with Metallic Specula, \$26.

Elliott's Set of Uterine Instruments.

\$25.

- 1 Handle to fit:
 - 1 Simpson's Sound.
 - 1 Guarded Scarifyer.
 - 1 Sanger's Porte Caustic.
 - 1 Ointment Bougie.
- 2 Mirror Specula.
- 1 Long Pipe Syringe.
- 1 Uterine Probe.
- 2 Phials, with glass stoppers.
- 1 pair Uterine Dressing Forceps.
- 1 Rosewood or Mahogany Case, lined with oil-dyed velvet.

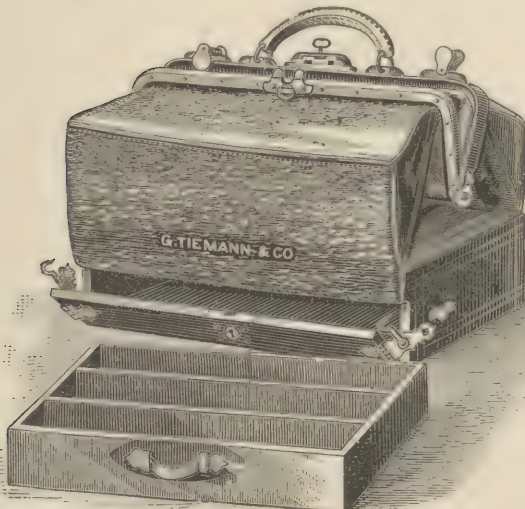
Thomas' Set of Uterine Instruments.

\$46.

- 1 Thomas' Cusco's Speculum.
- 1 Thomas' Sims' Speculum.
- 1 Caustic Holder.
- 1 pair (Uterine) Dressing Forceps.
- 1 Thomas' Cotton Expeller.
- 1 Small Uterine Probe.
- 2 Whalebone Swabs.
- 2 Sponge Holders.
- 1 Long Pipe Syringe.
- 1 Long-handled Tenaculum.
- 1 Small Phial, for holding solid caustic, *none for fluid*.
Place for a small roll of cotton batting and small sponges.
- 12 Sponge Tents.
- 1 Uterine Scarificator.
- 1 Mahogany, Rosewood or Morocco-covered Case, lined with oil-dyed velvet.

FIG. 3353.

Hunter's Gynæcological Bag.



Skene's Set of Uterine Instruments.

\$54.25.

- 1 Sims' Speculum.
- 1 Skene's Needle Forceps.
- 1 Skene's Scarifyer and Sound.
- 1 Skene's Elevator.
- 1 Long Pipe Syringe.
- 1 Nott's Depressor.
- 1 Uterine Dressing Forceps.
- 1 Straight Scissors.
- 1 Curved Scissors.
- 1 Tenaculum.
- 1 Uterine Probe and Slide.
- 1 Skene's Curette.
- 1 Sponge Holder.
- 1 Simpson's Sound, graduated.
- Russet Leather Case, lined with oil-dyed velvet.

GYNÆCOLOGICAL.

OPERATING AND DRESSING CASES.

Nott's Set of Uterine Instruments.

\$111.46

- 1 Nott's Speculum and Tenaculum.
- 1 Nott's Depressor.
- 1 Roux's Needle Holder.
- 1 Applicator and Expeller.
- 1 Sponge Holder.
- 1 Lead Sound.
- 1 Scarifying Knife.
- 1 Simpson's Sound.
- 1 Uterine Probe, pure silver.
- 1 Nott's Uterine Dilator.
- 1 Nott's Uterine Catheter.
- 1 Double Spring Tenaculum.
- 1 Hard Rubber Syringe, for Cleansing the Vagina and Uterus.
- 1 Lente's Ointment Syringe.
- 1 Lente's Platina Cup.
- 1 pair of Uterine Dressing Forceps.
- 1 pair of Needle Forceps.
- 1 pair of Seizing Forceps.
- 1 Straight Scalpel.
- 1 Curved Scalpel.
- 1 pair of Emmet's Scissors.
- 1 Sims' Adjuster.
- 1 Sims' Wire Pulley.
- 1 Sims' Blunt Hook.
- 1 Sims' Sigmoid Catheter, tin.
- 1 Sims' Sigmoid Catheter, hard rubber.
- 1 Sims' Sigmoid Catheter, silver.
- 1 Buttles' Scarifier.
- 1 Thomas' Dry Cupper and Suppository.
- 1 Smith's Wire Ecraseur.
- 6 Emmet's Round-pointed Needles.
- 6 Needles.
- Silk for Sutures and for Polypi.
- 3 Coils of Silver Wire.
- 1 Whalebone Cotton Swab.
- 2 Glass Bottles, for Caustic, &c.
- 12 Seatangle and Carbolized Sponge Tents.
- 1 Long Delicate Tenaculum.
- 1 pair of Long Straight Scissors.
- 1 Curette, for Scooping out the Uterus.
- 1 Rosewood Case, lined with oil-dyed velvet.

Mundé's Pocket Case, for Examinations and Applications.

- 1 Dawson's Double-Hinge Sims' Speculum.
- 1 Double Depressor.
- 2 Tenacula.
- 2 Mundé's Hard Rubber Applicators.
- 2 Straight Hard Rubber Sticks.
- 1 Curved Catch Dressing Forceps.
- Absorbent Cotton, Tampons, Leather Case.

Wylie's Office Examining Instruments, Polyclinic Set.

\$45.

- 1 Long-bladed Sims' Speculum.
- 1 Sims' Depressor, double.
- 1 Sims' Dressing Forceps.
- 2 Tenacula.
- 1 Simpson's Uterine Sound, graduated.
- 1 Wylie's Sound, pure silver.
- 1 Sims' Repositor.
- 1 Emmet's Applicator, pure silver.
- 1 Wylie's Cervical Protector.
- 1 Sims' Curette, small.
- 1 Wylie's-Sims' Dilator.
- 1 Wylie's Mucus Syringe.
- 1 Pouch, to roll up.

Wylie's Gynæcological Operating Instruments, Bellevue Hospital Clinic Set.

\$100.

- 1 Sims' Speculum, short bladed.
- 1 Sims' Depressor.
- 2 Sims' Tenacula.
- 12 Sponge Holders.
- 2 Scissors, curved flatwise, blunt and sharp pointed.
- 2 Knives.
- 1 Thumb Forceps.
- 6 Hæmostatic Pressure Forceps.
- 1 Angular Forceps.
- 3 Sims' Curettes, assorted.
- 12 Sims' Cervix Needles, 1 inch long.
- 12 Suture Needles, straight.
- 5 coils Silver Wire (Nos. 26 and 27) and Silk.
- 2 coils Catgut, Nos. 2 and 3.
- 1 Sims' Shield.
- 1 Sims' Wire Twister.
- 2 Applicators, whalebone.
- 1 Applicator, pure silver.
- 1 Sims' Rectal Speculum.
- 1 Sims' Uterotome.
- 1 Wylie-Sims' Dilator.
- 3 Glass Plugs.
- 1 Leather Pouch, to hold most of above instruments.

See VESICO-VAGINAL FISTULA SETS, . . .	page 462.
OPERATING FURNITURE,	51.
ANÆSTHETIC APPARATUS,	" 43.
ANTISEPTIC DRESSING OF WOUNDS, . . .	" 74.
DRAINAGE TROCARS AND TUBES, . . .	" 75.
PUS BASINS,	" 75.
PARACENTESIS,	" 126.
OVARIOTOMY TROCARS,	" 127.
ASPIRATORS,	" 129.

GYNÆCOLOGICAL.

UTERINE DIAGNOSIS.

Probes and Sounds.

"The uterine probe, or sound, is a useful instrument in diagnosis of uterine disease and displacement; its use gives us information of the presence of stenosis of the uterus, tenderness and flexions of the organ, the size and attachments of fibrous polypi, and some information regarding intra-mural fibroids, &c. *Caution.*—The surgeon should always be sure pregnancy does not exist before he attempts the introduction of the uterine sound. *Cellulitis* also contra-indicates its employment, even for purposes of diagnosis."—Eaton on "Diseases of Women." 1880.

FIG. 3354.—Thomas' Hard Rubber Probe.



G. TIEMANN & CO.

FIG. 3355.—Leadon Probe.



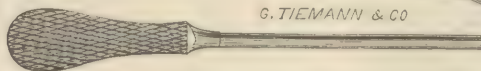
G. TIEMANN & CO.

FIG. 3356.—Silver Uterine Probe.



G. TIEMANN & CO.

FIG. 3357.—Chapman's Probe and Sounds.



G. TIEMANN & CO.

FIG. 3358.—Wyeth's Probe, Copper, Nickeled.

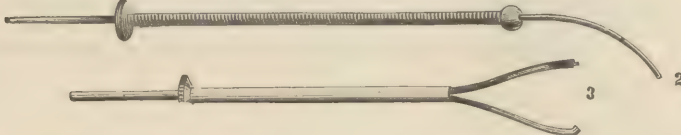


G. TIEMANN & CO.

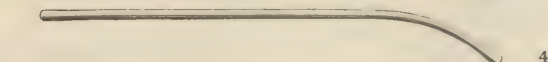
FIG. 3359.—Nott's Uterine Instruments.



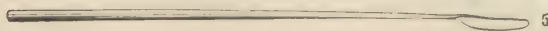
1



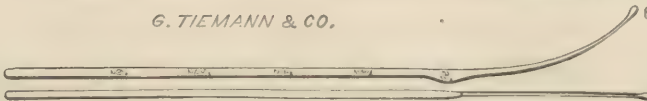
2



4

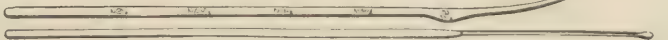


5



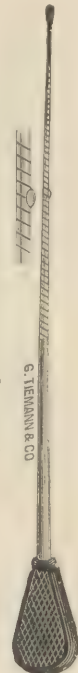
6

G. TIEMANN & CO.



7

FIG. 3361.—Jenks' Uterine Probe.



G. TIEMANN & CO.

FIG. 3363.—Silver Uterine Probe.



G. TIEMANN & CO.

FIG. 3360.—Thomas' Whalebone Probe (flat).

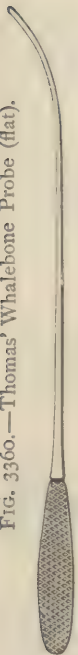


FIG. 3362.—Thomas' Elastic Probe.

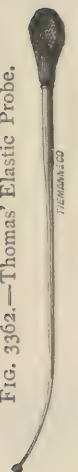


Fig. 3359.—No. 1 is a modification of Roux needle-holder. It is an excellent needle-holder, which may be used in the operations of vesico-vaginal fistula, cleft palate, &c., and it is made to serve as a handle to the instruments accompanying it; No. 2 combines the applicator with the sponge tent expeller; No. 3 is a sponge holder and ligating forceps; No. 4, a lead sound, which easily follows the curve of the uterus; No. 5 intra-uterine scarifying knife, blunt point; No. 6, Simpson's sound; No. 7, uterine probe, of pure silver.

GYNÆCOLOGICAL.

UTERINE DIAGNOSIS.

Probes and Sounds.

FIG. 3364.—Simpson's Uterine Sound, Graduated.



FIG. 3365.—Hunter's Uterine Sound.

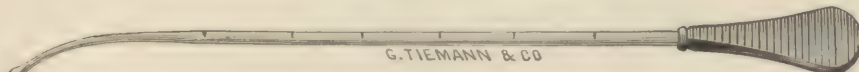


FIG. 3366.—Sliding Uterine Sound.



FIG. 3367.—Folding Uterine Sound.

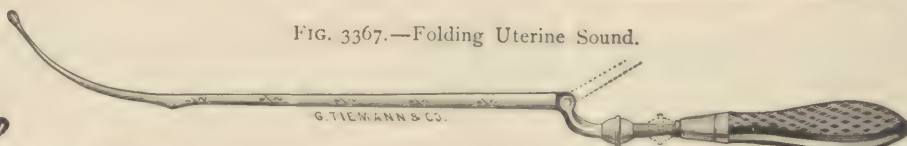


FIG. 3368.—Leonard's Uterometric Sound.

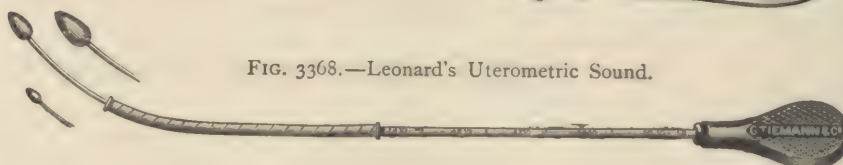


FIG. 3369.—Fitch's Uterine Sound.



FIG. 3370.—Leonard's Uterine Sound.



FIG. 3371.—Jenk's Uterine Sound.

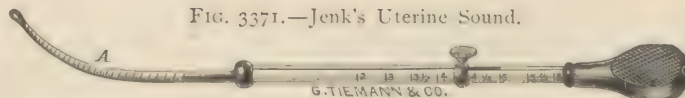


FIG. 3372.—Wylie's Cervical Speculum, or Protector.

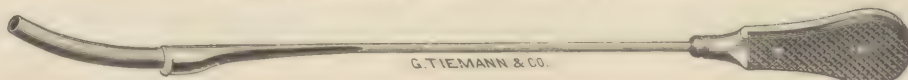


FIG. 3373.—Wylie's Cervical Applicator.

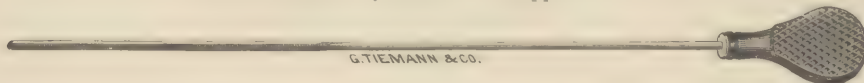


FIG. 3374.—Skene's Uterine Sound.



FIG. 3375.—Giddling's Uterine Sound.



GYNÆCOLOGICAL.

UTERINE DRESSING.

Dressing Forceps and Applicators.

FIG. 3376.—Uterine Dressing Forceps (slide catch).



FIG. 3377.—Nunn's Folding Uterine Forceps.

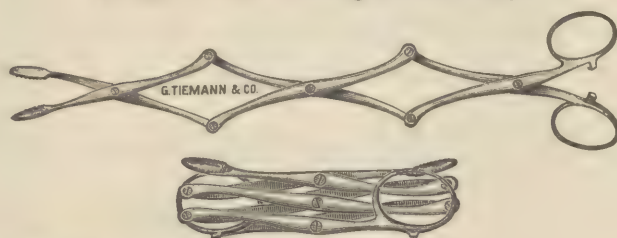


FIG. 3378.—Uterine Dressing Forceps.

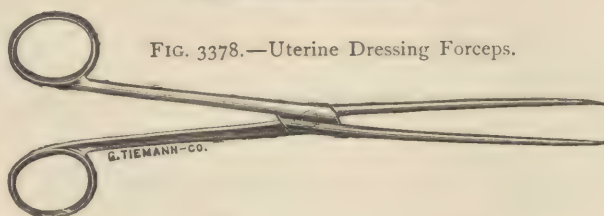


FIG. 3379.—Dressing Forceps.



FIG. 3380.—Newman's Metrorganon.



FIG. 3381.—Jones' Uterine Dressing Forceps.

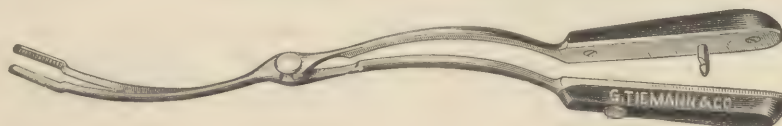


FIG. 3382.—Nunn's Uterine Dressing Forceps and Scissors.



FIG. 3383.—Uterine Dressing Forceps.



FIG. 3385.—Wackerhagen's Applicator.

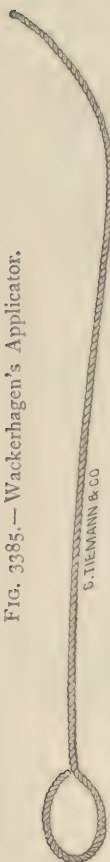


FIG. 3384.—Bozeman's Dressing Forceps.

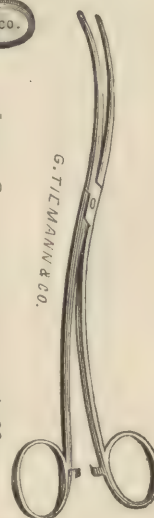
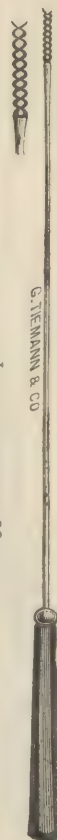


FIG. 3386.—Sims' Tampon Screw.



GYNÆCOLOGICAL.

UTERINE DRESSING.

Applicators for Solid, Powdered and Fluid Remedies.

"Medicinal agents may be applied to the mucous membrane of the vagina, intra-vaginal portion of the cervix and external os uteri by various methods, as in *solution* by vaginal injections, through specula, and on wads of cotton; as *powders*, through specula, on cotton and by insufflation; as *ointments*, through specula and by a syringe; in *suppositories* and *capsules*, through tubes."—MUNDÉ.

FIG. 3387.—Sims' Caustic Forceps.

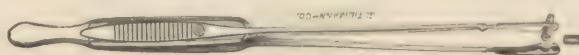


FIG. 3388.—Gardner's Caustic Forceps.

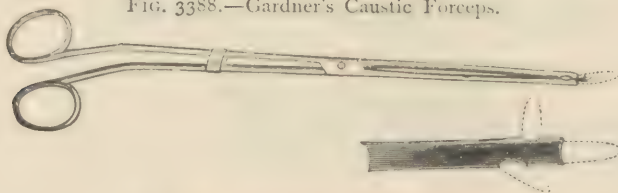


FIG. 3389.—Gardner's Caustic Holder.



FIG. 3390.—Turner's Applicator.

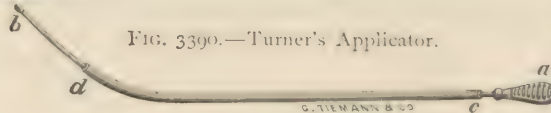


FIG. 3391.—Nunn's Applicator.



FIG. 3392.—Lente's Double Bulb Caustic Probe.



FIG. 3393.—Lente's Platina Cup.



FIG. 3394.—Emmet's Applicator.



FIG. 3395.—Skene's Instillation Tube.

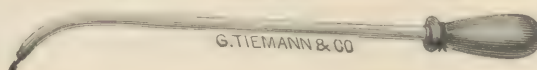


FIG. 3396.—Kelly's Silver Uterine Syringe.

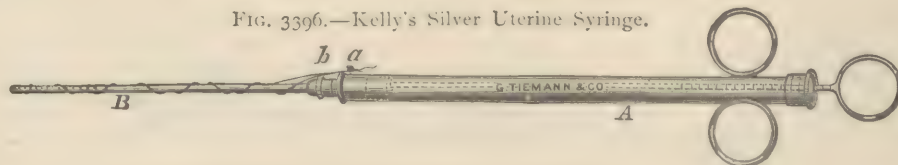


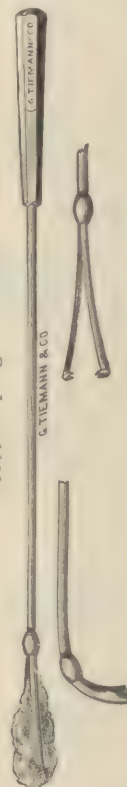
FIG. 3397.—Parker's Uterine Applicator (velvet eye).



FIG. 3398.—Edward's Caustic Holder.



FIG. 3399.—Sponge Holder.



GYNÆCOLOGICAL.

UTERINE DRESSING.

Applicators for Ointments, Solids and Fluids.

FIG. 3409.—Nott's Hard Rubber Uterine Syringe.



FIG. 3400.—Braun's Uterine Syringe.

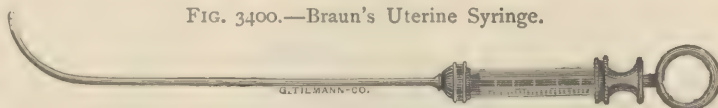


FIG. 3401.—Barker's Ointment Bougie.

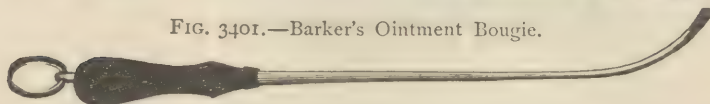


FIG. 3402.—Hutchison's Ointment Syringe.

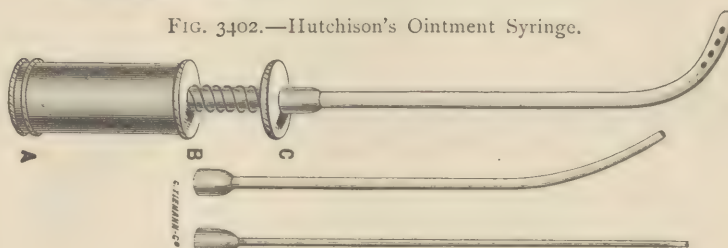


FIG. 3403.—Lente's Ointment Syringe.



FIG. 3404.—Lawson's Applicator.

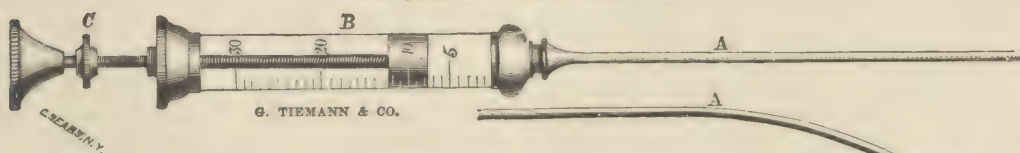


FIG. 3405.—Dick's Caustic Syringe.

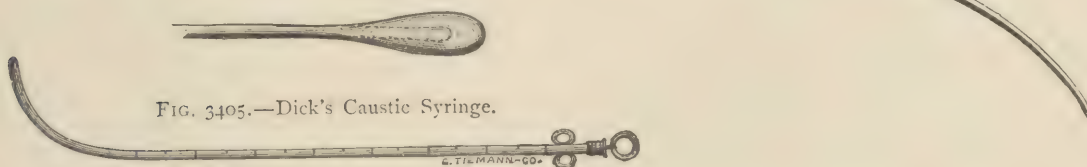


FIG. 3406.—Lallemand's Porte Caustic.



FIG. 3407.—Lente's Ointment Syringe.

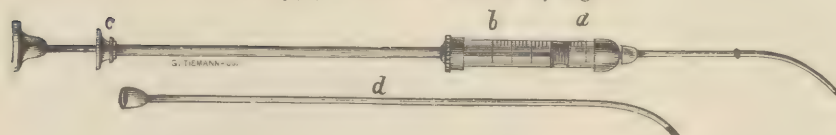


FIG. 3408.—Nott's Applicator.



GYNÆCOLOGICAL.

UTERINE DRESSING.

Introduction of Cotton Wool Charged with Remedies into the Vagina.

FIG. 3410.—Barnes' Tampon Speculum.



backwards as far as necessary; then, by compressing the external diverging blades, the internal ones are opened, and, by pushing on the piston or rod, the pledget is deposited in the vagina."—BARNES.

FIG. 3411.—Braun's Tampon Expeller.

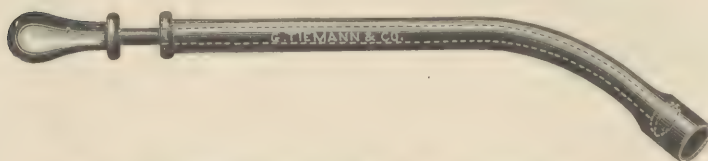


FIG. 3412.—Thomas' Tampon Expeller and Dry Cupper.



"To enable the patient herself to carry out this treatment. It is made of hard rubber and consists of two blades, moving on a pivot to come together, forming a hollow cylinder in which the pledget of wool is placed, the blades being kept in contact by a strong elastic ring outside. When charged, the patient, by simply opening the vulva, can pass the instrument into the vagina, directing the point

"*The Tampon.*—Had Sims' method of uterine examination done nothing else than lead to the proper method of using the vaginal tampon, it would have done by that alone a vast deal of good. Before its introduction the use of the tampon was a painful, uncertain and inefficient hæmostatic method. Since the use of Sims' speculum it has become an easy, painless, scientific and most effectual method for preventing and checking hæmorrhage from the non-pregnant uterus." THOMAS.

UTERINE DRESSING.

Vaginal Tamponade for Controlling Uterine Hæmorrhage.

"It is impossible to tampon the vagina effectually without the aid of Sims' speculum. The mere stoppage of the escape of blood from the vaginal outlet is not sufficient, for the accumulation may continue unsuspected in the upper part of the vagina. When the uterine hæmorrhage is free, we must prevent its escape from the os, as far as possible, and for this it may even be necessary to tampon the lower portion of the uterine canal. There is no danger of the uterus enlarging from concealed hæmorrhage, as after labor, nor do I think there is any probability of the escape of blood through the Fallopian tubes into the peritoneal cavity. The formation of a clot within the canal will excite the uterus to contraction, by which it will be forced out into the vagina. This is just the condition we wish to bring about; for, as the uterus contracts, its vessels are compressed and the flow of blood is checked.

"The best material for tamponing the vagina is damp cotton. A quantity of it is to be soaked in water and squeezed nearly dry. Then it should be thoroughly moistened in a saturated solution of alum, and again squeezed out. But, before the cotton has become too dry, it must be separated into portions, of which the edges are to be turned over, so that, when compressed between the hands, each shall be about two inches square and half an inch thick. If the pieces are then placed one upon the other, they will not become too dry before they can be used. Before introducing the tampon, the bladder must be emptied, the patient placed in the proper position on her left side and the speculum introduced. All the blood and clots must be first removed from the vagina and the whole passage mopped out with a piece of damp sponge held by a long dressing-forceps, or in a sponge-holder. When the bleeding is profuse, it may be necessary to make an application of iodine to the uterine cavity, to excite contraction. After a pledget of cotton has been properly twisted on the applicator, and the instrument has been bent to the curve of the uterine canal, it is to be dipped into the iodine and passed to the fundus. If we wish to leave the cotton behind, it is only necessary to loosen it from the applicator, by giving the instrument several turns in the opposite direction to that in which it was put on; and, as it is withdrawn, apply the nail of the index finger against one side of the instrument, which will cause the cotton to slip off and remain in the canal. Before introducing the tampon it is advisable, by means of a sponge-probang, thoroughly to smear the vaginal walls with vaseline or any other greasy substance of a proper consistence.

"The packing of the vagina is begun by placing over the cervix a pledget of cotton, dampened afresh with the solution of alum. Then a mass is rolled up and placed in the posterior *cul-de-sac*, close to the cervix, a similar one on each side and in front, and a flat piece over all. The pledgets are next placed around the cervix in a circle and the central place filled in. When the mass reaches the vaginal walls, it should be pressed back, with a stout whalebone stick, from the sides towards the centre, and, as room is thus gained, new portions of cotton must be slipped into place with

GYNÆCOLOGICAL.

UTERINE DRESSING.

Vaginal Tamponade for Controlling Uterine Hæmorrhage. (Continued.)

dressing forceps and pressed backwards as before, the pledgets being packed wherever space is gained. When the vagina has been well filled, the tampon is to be pressed firmly back with the stick from the anterior wall of the vagina towards the hollow of the sacrum, and, when the speculum has been placed in front of this, the space will extend nearly up to the uterus. This is to be filled in the same manner until the whole canal has been firmly packed. No force should be used, but, by going around and around the mass, and firmly packing in, with the forceps, one small portion after another, we can gradually distend the vagina, if necessary, until the whole basin of the pelvis is filled by the tampon.

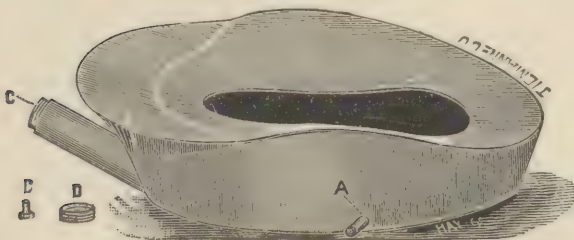
"It is always necessary to confine the patient to bed and to give an anodyne if the tampon is a large one, and the bladder may have to be emptied by means of a flexible male catheter. It is best, as a rule, to administer the anodyne by enema, using for this purpose, as I commonly do, the acetated tincture of opium; or, if more convenient, a suppository of morphine and belladonna may be used, but it must be passed high up into the rectum before the tampon is introduced. The most distressing effect of a large tampon is due to a pressure on the neck of the bladder. Should the anodyne fail to relieve this, the position of the patient must be shifted across the bed, her hips brought near the edge, her limbs flexed, and some of the cotton lying near the neck of the bladder be carefully removed. This may be done by means of a forceps, or better, by twisting the notched whalebone swab-stick into each piece, using the index finger as a guide. In a few hours, the vessels will have had time to contract, under the influence of the pressure, so that, as a rule, a sufficient quantity of cotton to give relief may then be removed with safety if the patient continues to keep the horizontal position. Notwithstanding the astringent and disinfectant properties of the alum, it will be necessary, after twenty-four or thirty-six hours, to remove the tampon, since by that time it will have become offensive from being saturated with blood and the secretions. After its removal a large injection of hot water, containing a little impure carbolic acid, should be administered, to wash out the vagina thoroughly, after which another tampon may be inserted if necessary. As the flow will, in all probability, have been greatly lessened by the pressure of the first tampon, the second one will not need to be so large. Before replacing the tampon it is well to encircle the cervix with several pledgets of cotton saturated with glycerine. Not only is this a good disinfectant, but it also renders the condition of the patient more comfortable, by removing the heat and dryness of the vagina which habitually follow the use of the alum and tampon."—"Emmet's Principles and Practice of Gynæcology." 1884.

"Dr. Frank P. Foster recommends the use of lampwick for tamponing the vagina, as a material always to be found. It can be easily saturated while in the ball with an astringent or other medication, and may be introduced with the aid of any speculum. It is sometimes desirable to tampon the cervical canal, or to introduce a medicinal agent into the uterine canal in such a manner as to insure its prolonged contact with the endometrium. For such purpose an inch or more of the end of the wicking may be stiffened with gelatine, and then, after having been dipped into the liquid to be applied, be introduced into the canal by means of dressing forceps. If care is taken not to coat the whole circumference of the wicking with the gelatine the liquid medicament readily permeates and a considerable quantity of it may thus be introduced within the uterine canal. Enough more wicking is then inserted into the vagina to act as a tampon; and, when this is removed, the portion originally introduced into the uterus comes out with it. When the tampon is to be removed, the patient simply makes traction upon the portion of wicking that was left hanging from the vulva, and the mass within the vagina is unwound as the traction proceeds; consequently no large wad has to pass the vaginal orifice, and the extraction of the tampon is painless."—"Remarks on Vaginal Tampons." *N. Y. Medical Journal*, June, 1880.

UTERINE IRRIGATION. DOUCHING.

For Hot or Cold Injections per Vaginam.

FIG. 3413.—Hospital Bed Pan.



The very general use of hot injections, both for purposes of cleanliness and medication, necessitated the manufacture of some suitable vessel to receive the fluid as it is discharged. Such a receptacle is now furnished in the hospital bed pan. Especially in the case of applications *per vaginam*, in which heat is an important factor, it is necessary that the good effect upon the circulation should not be counteracted by pressure upon the very parts designed to be relieved. It is therefore essential that the patient be kept in a recumbent position and that she should

GYNÆCOLOGICAL.

UTERINE IRRIGATION. DOUCHING.

For Hot or Cold Injections per Vaginem. (Continued.)

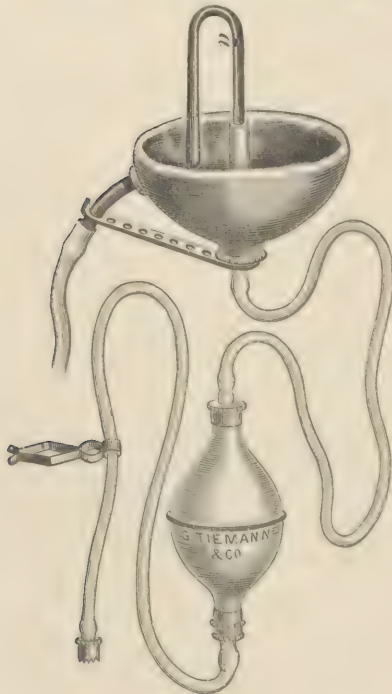
not be exposed to cold, either during or after taking the injection. The hospital bed pan meets all these requirements; it is of large capacity, and its form is adapted at once to fit the body while lying down and to prevent any spilling of the contents on the bed. The pan holds nearly seven pints, which is sufficient for most purposes. It is emptied through the handle *C*, by unscrewing the cap *D*. When, however, it is to be used in cases requiring a larger volume of liquid, the plug *B* is removed and heavy rubber tubing is attached to the tube *A* to carry off the outflow; the quantity of water used may then be *ad libitum*. The hospital bed pan is also used for receiving rectal discharges, either with or without injections. For this purpose it is better than the common porcelain bed pan, on account of its capacity and form.

"Dr. R. B. Dixon explained the advantages of a douche pan invented by W. M. Searby. The pan is of large size and its shape is such that it can be easily placed in position for use, and the patient can remain undisturbed in a recumbent position as long as may be necessary to inject a large volume of water, no discomfort from wet or any other cause being experienced. The pan is used largely in hospital practice, and is highly spoken of. One great advantage it possesses over other pans exhibited is that it is by far the least expensive of them all."—*Boston Medical and Surgical Journal*.

Vaginal Injection Apparatus.

"The injection can be better administered to the patient after she is undressed for the night and in bed. She should be placed near the edge of the bed, with her hips elevated as much as possible by the bed pan, and a small pillow under her back, the lower limbs being flexed. Her body must be covered, to protect her from cold, and her position made perfectly comfortable; when the bed is a soft one, a broad board should be placed under the pan to prevent it from sinking down by the weight of the patient, and to keep the hips elevated. The vessel of hot water is placed on a chair by the bedside, and the nurse passes the nozzle of the syringe over the perinæum into the vagina, directing it along the recto-vaginal wall until it has reached the posterior *cul-de-sac*. The water must be thrown in, at first, very carefully, until the vagina has become distended. If the nozzle is not properly introduced, the stream of water may be thrown directly into the uterine canal. The forcible entrance of any fluid into the undilated uterus causes intense pain, and frequently alarming symptoms of nervous prostration or collapse; and sometimes it is the cause of cellulitis. At the completion of the injection, the vagina can be emptied by depressing the perinæum for a few seconds, with the finger on the nozzle of the syringe before withdrawing it; and, as the bed pan is removed, a napkin should be placed against the vaginal outlet to absorb any water which may have been retained. When circumstances prevent the injections being thus administered, it is better to use a fountain or siphon syringe than that the patient should attempt to give them to herself. This mode, however, can only be regarded as a substitute, for it is never so efficacious. In any event the same elevated position of the hips is necessary. A steady stream is never so serviceable as the interrupted current from a Davidson's syringe. Hence it would seem as if, in addition to the heat of the water, the jet from the syringe acted as a stimulus to excite the bloodvessels to contraction.

FIG. 3414.—Foster's Vaginal Syringe.



"Dr. Frank P. Foster has had constructed an arrangement by which the bed pan can be dispensed with, and which does not require an assistant to administer the injection. A cup or shield is made by depressing one half of an india rubber bag into the other half and screwing the two together. This point is pierced by the pipe of a Davidson's syringe, and fixed by a brass cap. On compressing the bulb, the water is forced directly through the vaginal portion, or nozzle, of the syringe, which is shaped like the letter U, and pierced with one hole near the bow of the U, on its inner side. Now, as the soft india rubber cup is held over the labia, the only escape for the water is by the outflow tube. The nozzle is attached to the cup by a short piece of tubing, so that it may turn in various directions without displacing the cup. The patient's hips should be elevated, so that the vagina may be kept fully distended, and only the surplus water be allowed to flow off by the outflow tube."

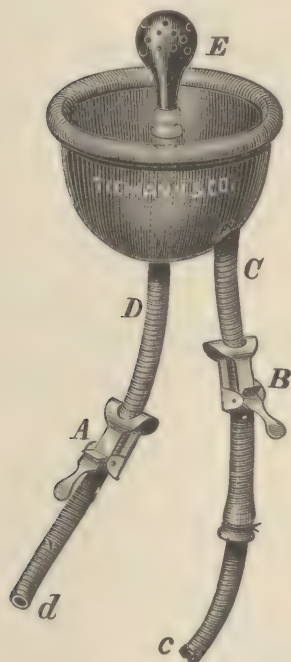
"Emmet's Principles and Practice of Gynæcology." 1884.

GYNÆCOLOGICAL.

UTERINE IRRIGATION. DOUCHING.

For Hot or Cold Injections per Vaginam.

FIG. 3415.
Fraser's Intra-Vaginal Syringe.



"The proper administration of therapeutic vaginal injections in the dorsal recumbent position, with hips elevated, is almost impossible, owing to the discomfort, annoyance and expense attending the use of the various contrivances for receiving the injection fluid as it leaves the vagina. These are entirely overcome by the simple instrument shown in the accompanying woodcut.

"The instrument consists of a cup made of soft rubber with a flexible ring around the top. Through the bottom of the cup pass the afferent tube (D), with hard rubber nozzle, and the efferent tube (C), to which is attached a waste pipe two feet and a half long, for conveying the fluid into a receptacle under the bed or table. These tubes are supplied with patent stop-cocks (A and B). The nozzle (E) may be removed from the cup when desired. The cup is readily introduced into the vagina by compressing the flexible ring, which easily passes the sphincter muscles, and, expanding, produces sufficient pressure on the vaginal walls to prevent the escape of the fluid, except through the efferent tube.

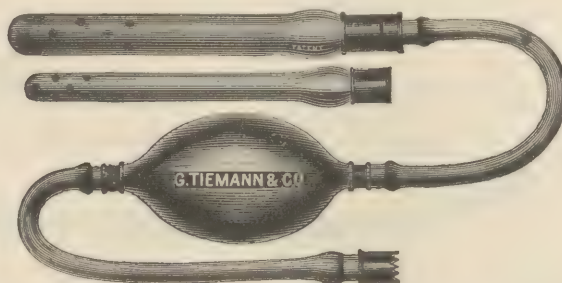
"The nozzle of any style of syringe may be inserted into the efferent tube, and any quantity of water may be injected with perfect comfort to the patient. The patient lying on the back, with hips slightly elevated, the fluid dilates the upper portion of the vagina and comes in contact with the entire surface, while the more sensitive portions of the vagina, vulva and peritoneum are completely protected in case very hot water is used.

"In applying to the vagina or cervix, glycerine or glycerole of tannin, or any fluid application, the nozzle being removed, close the stop-cock, B, in the efferent tube, remove the waste pipe, inject the application, close the stop-cock, A, and leave the instrument *in situ*. Instruct the patient to allow the fluid to escape at a specified time and remove the instrument, or allow it to remain in the vagina as a temporary support to the uterus, thus doing away with cotton and oakum tampons. Many ways will suggest themselves to the physician in which this simple instrument may be made useful."—E. P. Fraser, M. D. Professor of Gynæcology, Medical Department of the Willamette University, Portland, Oregon.

FIG. 3416.—Frost's Vaginal Douche.



FIG. 3417.—Thornton Parker's Vaginal Syringe.



"To meet a want in our practice, and remedy defects which detract from the utility of the instruments now commonly in use, we have devised a syringe, manufactured by Messrs. Tiemann & Co., of New York city. This syringe is made entirely of rubber and the vaginal and rectal tubes are perfectly flexible. There is no terminal orifice, but the sides are perforated with "velvet eyes" for a distance of nearly two inches from the end. These rubber syringe-points do not lacerate the mucous membrane, nor produce the injury so often caused by the hard metallic tubes. The bulb and tubes are large and insure a copious supply of water."—Thornton Parker, M. D., of Newport, R. I., in *Medical Record*, July 5, 1879.

"Fig. 3416 is intended to be a convenient and efficient instrument for administering the prolonged hot water douche, as recommended by Dr. T. A. Emmet. It consists of two portions: the nozzle and tube through which the injection is to flow, and the bulbous part around it, which is introduced into the vagina, acting as a plug to cause the vagina to be filled with water, the surplus passing off through the hollow bulb and out through the overflow tube into a receptacle placed beside the bed."—L. A. Frost, M.D., in *Medical Record*, Feb. 28, 1885.

GYNÆCOLOGICAL.

UTERINE IRRIGATION. DOUCHING.

For Hot or Cold Injection per Vaginem.

FIG. 3418.—Woodward's Uterine Syphon Douche.

FIG. 3419.—Byrne's Reflux Catheter and Adjuster.

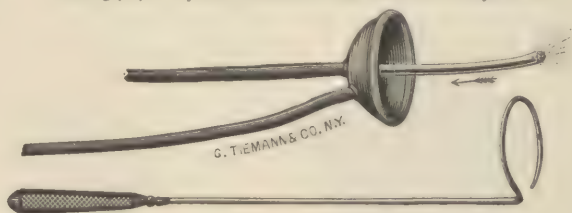
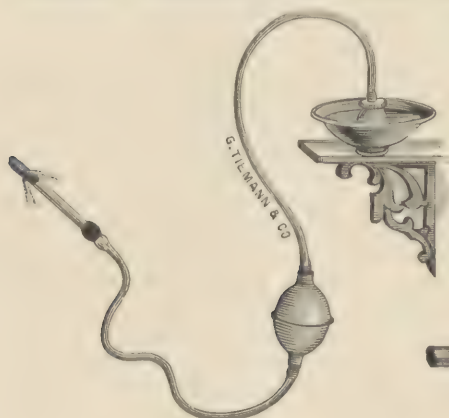
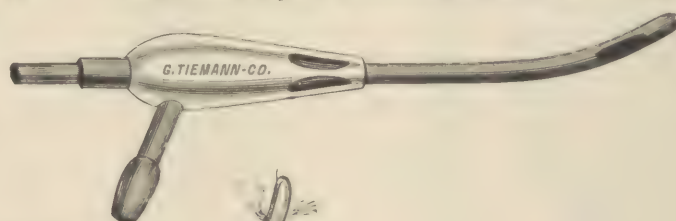


FIG. 3420.—Reliquet's Double-Current Catheter.



FIGS. 3421, 3422.—Nott's Double-Current Catheters.

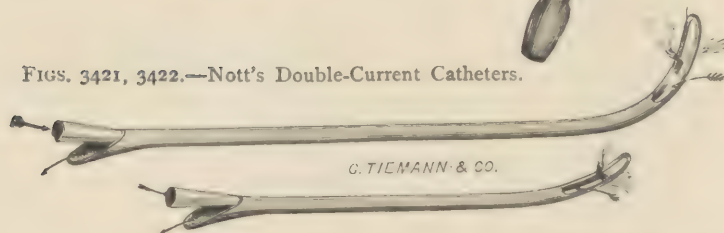


FIG. 3423.—Bozeman's Intra-Uterine Backflow Tube.

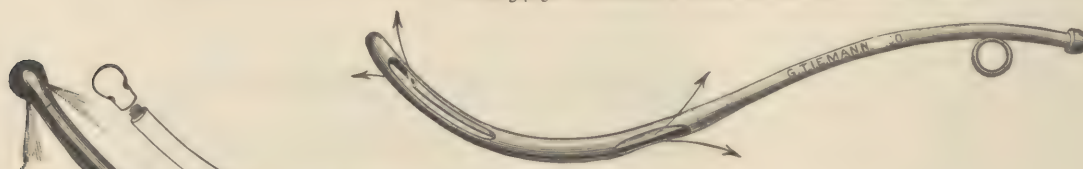


FIG. 3424.—Hanks' Intra-Uterine Douche Tube.



'This hard rubber tube (which is represented by Fig. 3424) is about twelve inches in length and one-fifth to one-fourth of an inch in diameter. The distal end is bulb-shaped and removable, about one-third to one-fourth of an inch in diameter. It should be attached in the usual manner of a screw-cap. The openings in the bulb-shaped end are so arranged, as seen in the cut, that the fluid used is forced backward toward the proximal extremity of the tube, thus avoiding, as much as may be, the danger of forcing fluid into the Fallopian tubes. When the tube is to be cleansed, it is only necessary to remove the bulb-shaped end, and every septic germ can be easily reached and destroyed. The proximal end of the tube is arranged, of course, for attaching the rubber tube of whatever syringe it is desired to use. It can be easily bent to any angle by oiling and heating over an alcohol lamp or coal fire, or by simply placing the tube in a bowl of hot water for a few moments.'—H. T. Hanks, M. D., in *New York Medical Journal*, Sept. 18, 1886.

"*Proper Vaginal Syringe Nozzle.*—Sometimes, where the cervix is lacerated or the cervical canal dilated, the patient will carry the instrument directly into the os externum and project a large amount of fluid into the uterus. Such an accident is followed by violent uterine contractions, and the probable passage of the liquid into and perhaps through the Fallopian tubes, and this often results in a degree of pain which almost causes collapse and sometimes even pelvic peritonitis. This accident can always be prevented by having the nozzle of the syringe made with a reverse current."—Thomas, on "Diseases of Women." 1880.

GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

Repositors, Elevators, Redressors.

FIG. 3425.—Sims' Uterine Elevator, No. 1.

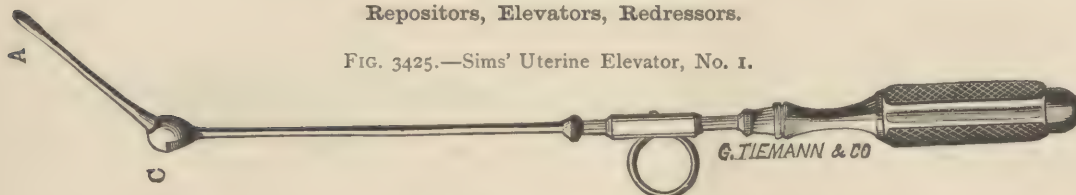


FIG. 3426.—Sims' Uterine Redressor, No. 2.

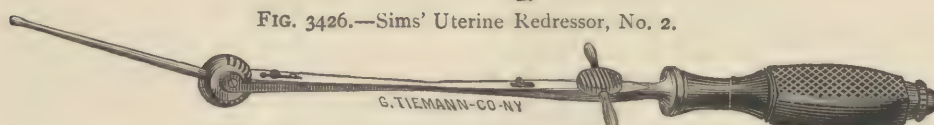


FIG. 3427.—Emmet's Uterine Elevator.

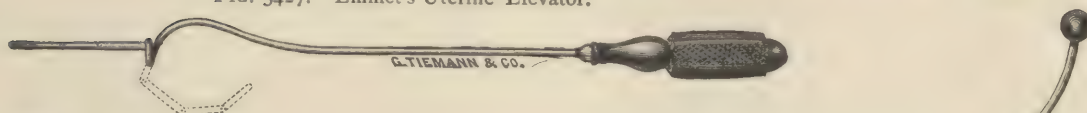


FIG. 3428.—Guernsey's Elevator.

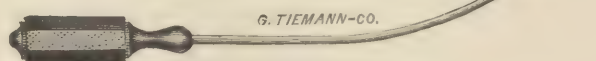


FIG. 3429.—Gardner's Manifold Instrument.

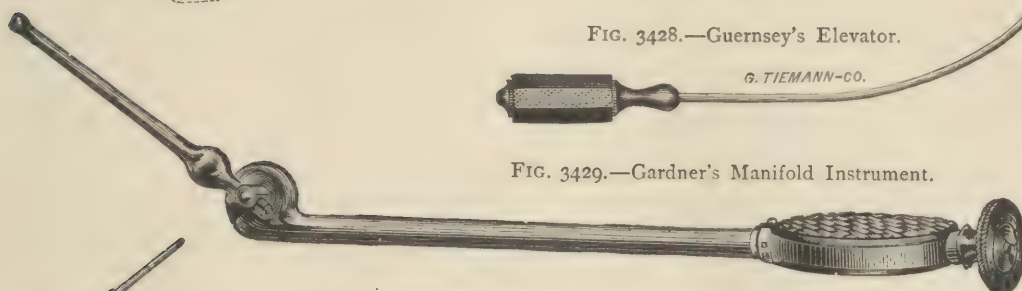
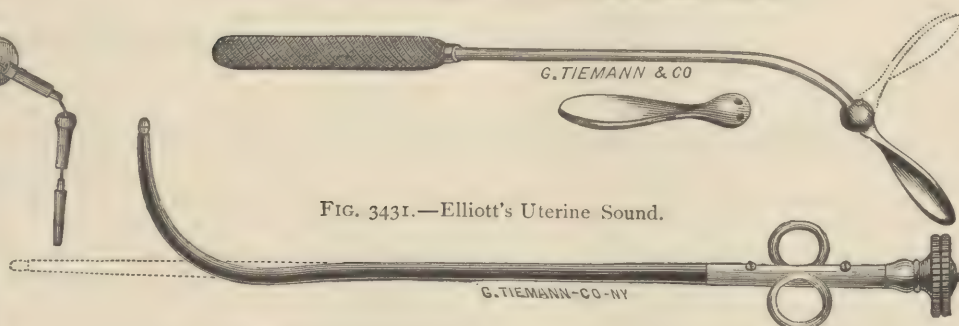


FIG. 3430.—Stowe's Retroversion Elevator.



FIG. 3431.—Elliott's Uterine Sound.



"By means of a screw in the handle the point of the instrument is moved from side to side, or extended in a direct line; hence making it easy of introduction, and, when introduced, we have but to turn the screw in the handle to bend the other end of the elevator in the opposite direction, and thereby correct the flexion we wish to rectify. In inversions of the uterus it is equally serviceable."—EATON.

FIG. 3432.—Skene's Elevator and Curette.

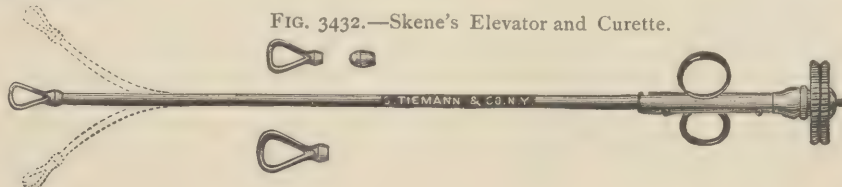
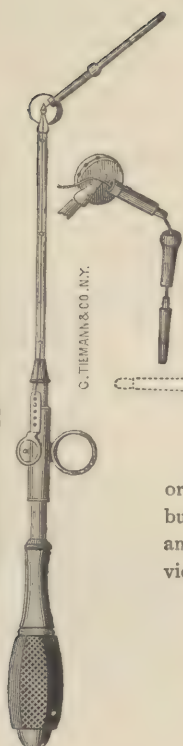


FIG. 3433.—Noeggerath's Uterine Elevator.

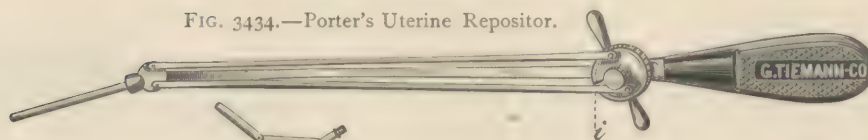


GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

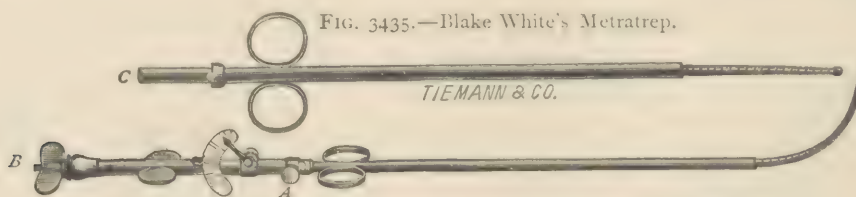
Repositors, Elevators, Redressors.

FIG. 3434.—Porter's Uterine Repositor.



"It is easy to carry the instrument to place, and the points being of copper, can be curved to any required degree, and may be carried along the uterine canal and take any direction necessary. On the lever disc is a mark (*i*) that shows the direction and angle the uterine point has taken. After the point is fully within the uterus, and it ought to reach to the fundus, but not press thereon, the forefinger of one hand may be used to assist the instrument by pushing against the body of the uterus as felt through the vaginal wall. The forefinger of the hand holding the instrument pressed against one lever and the thumb pulling on the other will cause the point to rotate so as to bring the uterus to the desired position. You know as you use it how much power or force you are exerting and how much you have moved the organ at any time; you can judge of the rigidity or elasticity of the parts moved, because the whole force is in your fingers, and not in a screw. After having moved the uterus into place, by letting go the levers, you will be able to see if it tends to return back again to its old position. As there has always been a difficulty after replacement of a uterus with an instrument in getting the point out again without turning the organ back to its wrong position, I have had points made which flex only in one direction. These points enter the uterus with the greatest facility, and, if the version is complete after introduction, the instrument will perhaps need to be revolved upon its axis, and then use the lever disc. The turning the instrument on its axis is to bring the uterine point into proper relations so as to get its rigid action. In taking the instrument out, elevate the handle towards the abdomen, so as to cause the button disc to describe an arc of a small circle from the uterus backwards, downwards, and then forwards. By this motion the point will slip out without displacing again the replaced organ. A rubber disc is also made to go on the button disc for use in cases where the instrument might too easily enter the os, such as in lacerations, gaping os tinæ, &c. With no other instrument can the uterus be so easily manipulated in examinations made to decide the question of attachment or non-attachment of tumors to itself within the abdomen. Here the rigid points are best. You can definitely guide the uterus between adhesive bands into its natural position, and as easily return it again if there would seem to be any necessity therefor."—J. A. Porter, M.D. *Medical News*, May 6, 1882.

FIG. 3435.—Blake White's Metratrep.



"The *metratrep* (μήτρα, the womb, and πετρέιν, to turn) is composed of two parts. The first is a straight tube (C). At the larger extremity two rings are attached, by means of which the operator is enabled to steady and guide the stem when searching for or operating upon flexions about the womb. At the end of this tube is a highly flexible and elastic spiral attachment, terminating in a blunt probe-point. This spiral attachment, being graduated to the depth of a normal womb, does not exceed two inches and a half in length and is pliant; it can, with the slightest effort, be made to follow the most devious uterine flexion without causing any pain.

"The second part, which is intended to be combined with or disunited from the first part at will by means of a catch at A, consists of a split metallic spring, made to fit the calibre of the tube above described precisely as a sword its scabbard. This spring is furnished with a separate handle, upon which is attached a graduated dial-plate with a movable index. By means of a governing screw placed at the butt of this handle (B), the point of the spring, which is within the spiral inclosure, can be forced to turn upward or downward, the index meantime recording very faithfully every change of direction impressed by the will of the operator.

"Introduced into a retroflexed uterus, the spiral extremity, yielding to the maldirection, turns backward and downward to the precise degree of flexion existing. To restore the organ to its normal position, it is, therefore, necessary only to operate upon the governing screw at B. The combined instrument is held steadily and firmly in place after its introduction, and, by simply turning the screw referred to, the body of the organ can be gradually and painlessly lifted into its proper place. As soon as this is accomplished, the index will announce the fact, when the instrument can be carefully withdrawn, leaving the organ in its redressed condition."—*N. Y. Medical Journal*, April 10, 1886.

GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

Repositors.

FIG. 3436.—Leonard's Uterine Repositor.

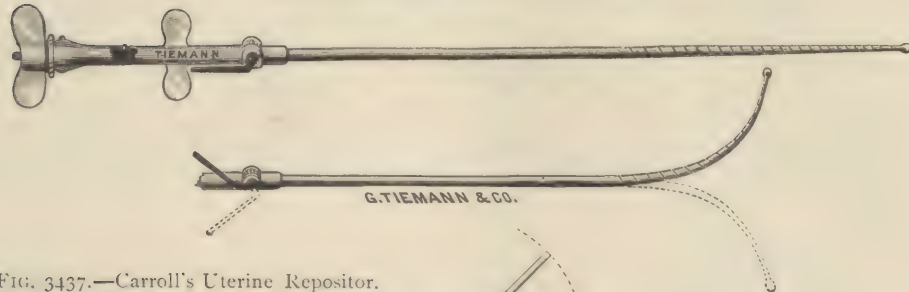
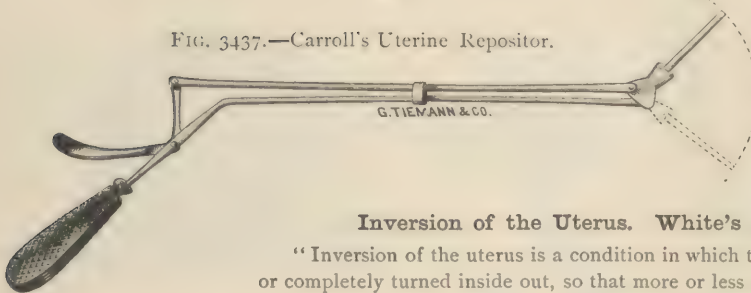


FIG. 3437.—Carroll's Uterine Repositor.



Inversion of the Uterus. White's Method of Reduction.

"Inversion of the uterus is a condition in which the uterus has become either partially or completely turned inside out, so that more or less of the inner surface forming the uterine canal projects through the dilated os into the vagina. The injury results from childbirth or from the growth of some interstitial tumor which had already begun to project into the uterine canal.

"One hand is introduced into the vagina, for the double purpose of grasping the uterus and, at the same time, keeping pressed against the fundus an india rubber cup, from which, projecting outwards, is a short staff, having at its other end a stout steel spiral spring. This spring has a pad at its extremity (not shown in the cut) and is intended to rest against the body of the operator, so as to maintain a steady pressure. The effect of this is to put the vaginal canal on the stretch, so that by traction on the walls the ring at the seat of inversion above may be dilated. The other hand is employed to steady the uterus and, at the proper time, to aid by making counter-pressure, with the view of rolling out the tissues at the seat of inversion."—"Principles and Practice of Gynæcology." Emmet.

FIG. 3438.—White's Uterine Repositor.

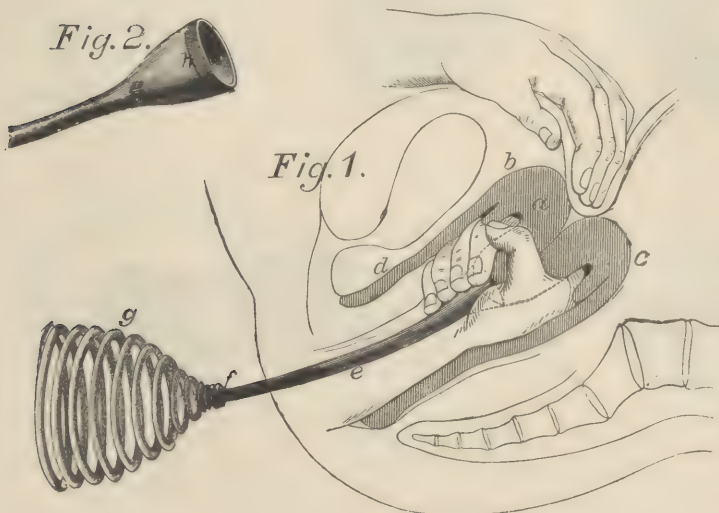


FIG. 1.—*a*. Uterus in process of reduction.

b. Anterior lip or wall of the uterus with the fingers of the left hand pressing upon it and assisting in pulling open the uterine cavity.

c. Posterior uterine wall semi-reflected.

d. Anterior vaginal wall.

e. Wooden or hard rubber stem of repositor, its enlarged extremity held in contact with the fundus by the intra-vaginal hand of the operator.

f. Distal extremity of stem made into a screw, so as to fasten into *g*, a coil of No. 11 steel spring wire, requiring eight or ten pounds pressure by the breast of the operator, against which it is placed, to bring it down.

FIG. 2.—*h*. Uterine extremity of stem *e*, which is terminated with a soft india-rubber disc $1\frac{3}{8}$ inch diameter, the concavity into which the fundus is received being about one-half inch deep, with its terminal margin thin and soft.

GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

Supports, Pessaries, Hysterophores.

"PESSARY, Pessarum.—An instrument, made of cork, ivory, hard rubber or elastic gum, which is introduced into the vagina to support the uterus in cases of prolapsus of the uterus or relaxation of the vagina; to keep vaginal hernia reduced, &c. The ancients made use of *medicated pessaries*, which they distinguished into emollient, astringent, aperient, &c., and they are still used, although generally called *vagina! suppositories*. An *anal pessary* is sometimes employed for the compression of hæmorrhoids. The form of pessary is very variable—round, oval, &c., according to fancy and circumstances. Some of them have an external support from a stem—the intra-uterine pessary, for example. Some forms of pessary are referred to according to their shape, as the ring pessary, the horseshoe pessary, &c., and the various modifications of shape are also named after their proposers."—DUNGLISON.

FIG. 3439.—Ring Pessary.

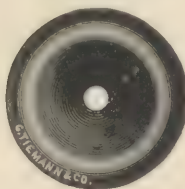
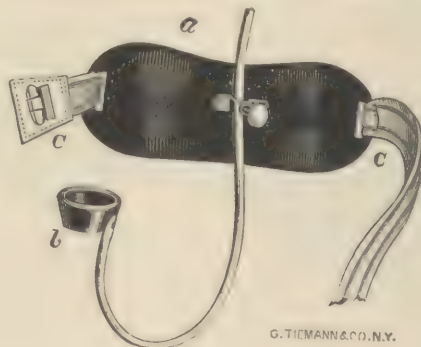
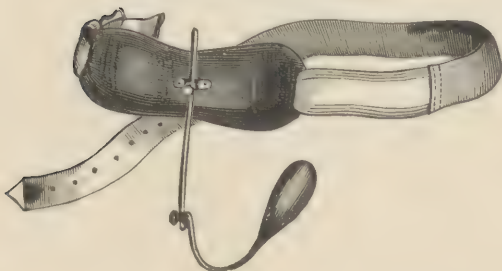
FIG. 3440.
Cutter's Cup
Pessary for Pro-
lapsus.FIG. 3441.
Bozeman's Vaginal Dilator.FIG. 3442.
Inflatable Ring
Pessary.
Soft rubber.FIG. 3443.
Inflated Pessary.
Soft rubber.FIG. 3444.
Concave Pessary.
Hard rubber.FIG. 3445.
Inflatable Ball
Pessary.
Soft rubber.FIG. 3447.
Tiemann & Co.'s Uterine Supporter.

FIG. 3446.—Rozer's Pessary.



GYNÆCOLOGICAL.

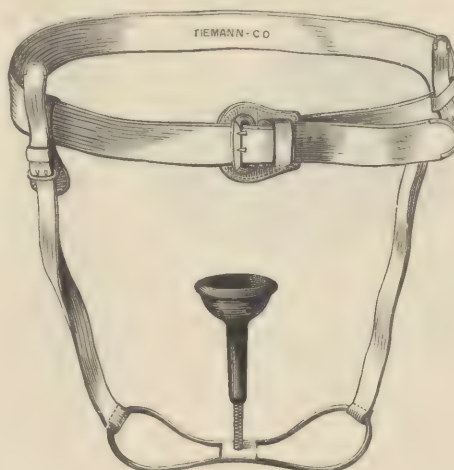
UTERINE. MALPOSITIONS, DISPLACEMENTS.

Supports, Pessaries, Hysterophores.

FIG. 3448.—Thomas' Supporter.



FIG. 3449.—O'Leary's Pessary.



McIntosh's Uterine Supporters.
FIG. 3450. FIG. 3451. FIG. 3452. FIG. 3453.

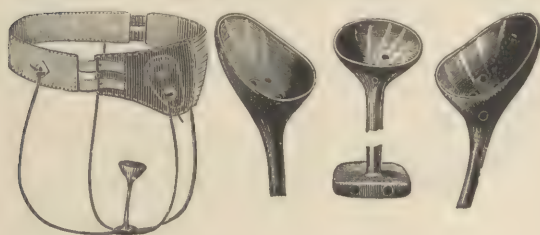


FIG. 3454.—Hornby's Pessary.



FIG. 3455.
Babcock's Pessary.

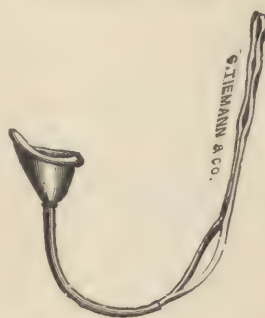


FIG. 3456.
Donaldson's Uterine Supporter.



FIG. 3457.—Cutter's Ring Pessary.

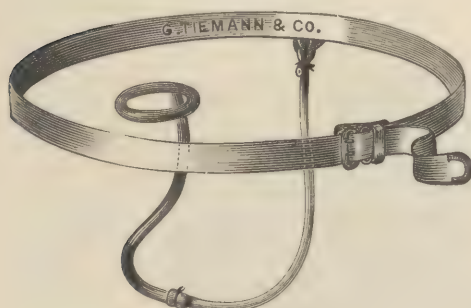
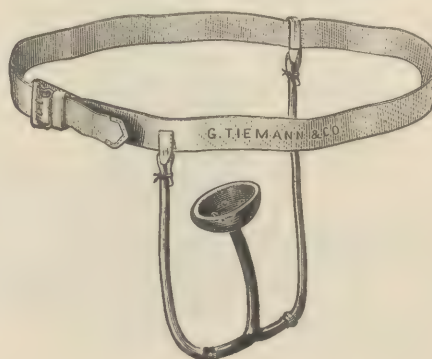


FIG. 3458.—Thomas' Cutter's Cup Pessary,
for Prolapsus.



See other SUPPORTERS, page 328.

GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

Supports, Pessaries, Repositors, Hysterophores.

FIG. 3459.
Bozeman's Vaginal Support.



by means of the uterine sound and stem pessary has been unsatisfactory, and, according to my experience, a more comfortable, safe and effective method is unquestionably a great desideratum."—Extract from "Retroversion in Relation to Lacerations of the Cervix Uteri." By Nathan Bozeman, M. D., New York.

"The instrument is made of steel wires. It is elastic and thoroughly self-sustaining. It has vesical and rectal branches which are covered with thin rubber up to points near the heel of the instrument, where an opening is left for the escape of the menstrual and other discharges. Upon the vesical branch is set a cushion which is to receive and support the vesico-vaginal septum. The covering of the rectal branch is distended with air in order that it may adapt itself uniformly to the recto-vaginal septum. The two uneven bows are united by a broad elastic apron, which is to receive the cervix uteri, and to a certain extent support the weight of the entire organ.

"Retroflexion and fixation of the uterus in the hollow of the sacrum constitute the largest class of uterine displacements, and often the most deplorable, which we are called upon to treat. Hitherto, treatment of these cases

FIG. 3460.
Campbell's Pneumatic Uterine Repositor.

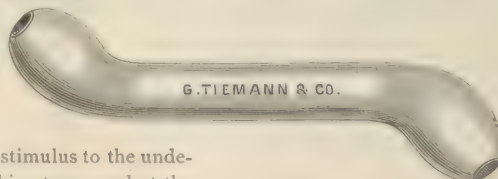
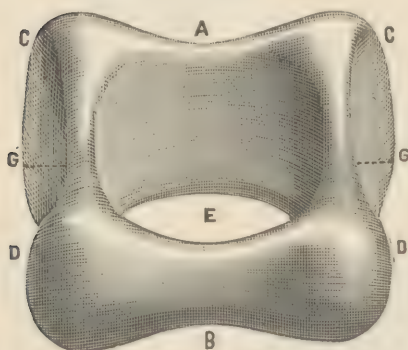


FIG. 3461.—Hofmann's Pelvic Pessary.
Soft rubber, inflated



"An efficient stimulus to the undeveloped or atrophic uterus, and at the same time to the ovaries, is the interrupted or faradic electric current. This may be applied to the endometrium by means of an insulated steel sound, the other electrode being placed alternately on the abdomen over the fundus uteri and each ovarian region, or over the sacrum; the strength of the current and the length of the sitting will depend on the sensibility of the patient, and should gradually be increased until the full strength of the battery is applied and the sitting lasts thirty minutes. As with a medi-

cinal application, so should the electricity be applied most thoroughly immediately preceding a menstrual epoch, and two or three times a week or oftener in the interval."—"Minor Surgical Gynæcology." Mundé.

See ELECTRODES, page 34.

FIG. 3463.

Globe Pessaries.

FIG. 3464.

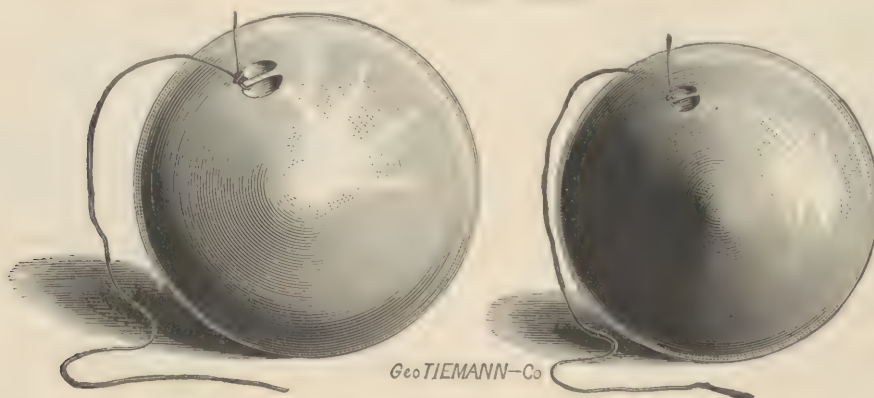
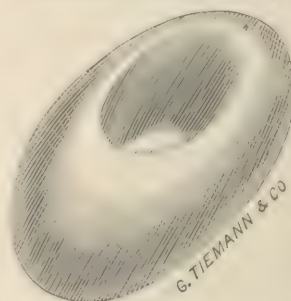


FIG. 3462.—Hurd's Pessary.



GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

Supports, Pessaries, Hysterophores.

FIG. 3465.—Ring Pessary.

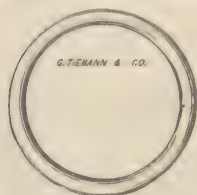


FIG. 3466.—Sims' Pessary Introducer.

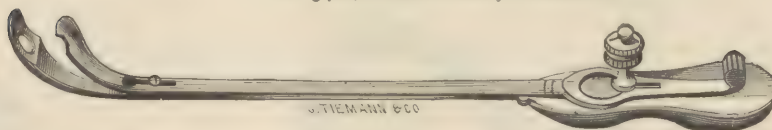


FIG. 3467.—Trask's Pessary.

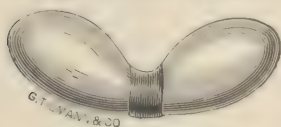


FIG. 3468.—Noeggerath's Pessary.

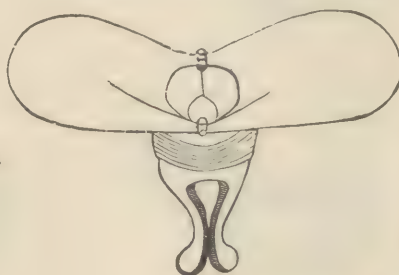


FIG. 3469.—Trask's Pessary.

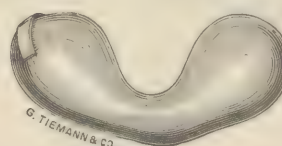


FIG. 3470.—Graily Hewitt's Pessary.

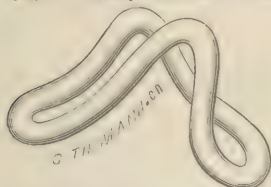


FIG. 3471.—Wilhoff's Pessary.



FIG. 3472.—Hodge's Pessary.



FIG. 3474.—Zwank's Hysterophore.



FIG. 3473.—Hodge's Pessary.



FIG. 3475.
Taliaferro's Universal Pessary.



FIG. 3476.—Todd's Pessary.

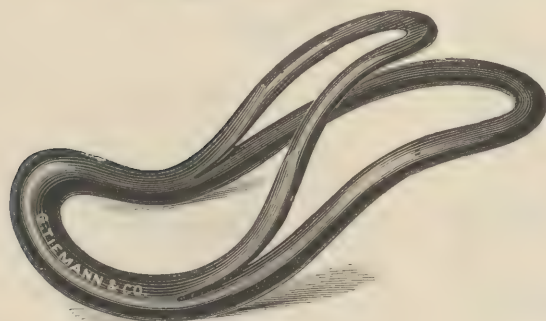


FIG. 3477.
Taliaferro's Retro-Displacement Pessary.



GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

Supports, Pessaries, Hysterophores.

FIG. 3478.—Chamberlain's Pessary.



FIG. 3479.—Chamberlain's Pessary.



FIG. 3480.—Frazer's Pessary.



FIG. 3481.—Fowler's Pessary.

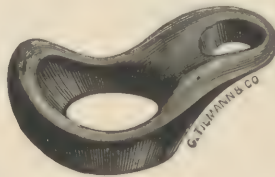
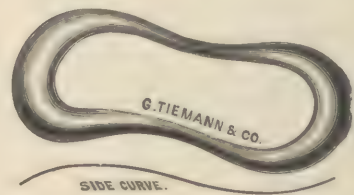
FIG. 3482.
Campbell's Soft Rubber Pessary.

FIG. 3483.—Hewitt's Pessary.

FIG. 3484.—Hodge's
Horseshoe Pessary.

FIG. 3485.—Sleigh Pessary.

FIG. 3486.—Coleman's Modification of Hodge's
Open-lever Pessary.

It is made of copper wire, covered with soft rubber, and can be bent into this (Fig. 3487) or any desired shape.

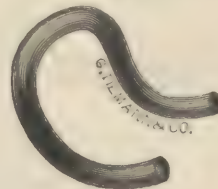
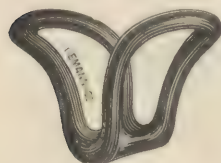
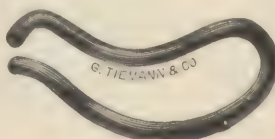
FIG. 3487.—Coleman's
Pessary (shaped).FIG. 3488.
Graily Hewitt's Pessary.

FIG. 3489.—Brown's Pessary.

FIG. 3490.—Hodge's
Closed Lever Pessary.

GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

Supports, Pessaries, Hysterophores.

FIG. 3491.—Thomas' Anteversion Pessary.

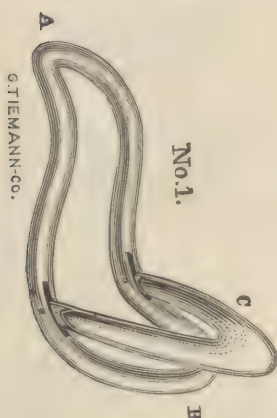


FIG. 3492.—Thomas' Hewitt's Retroversion Pessary.

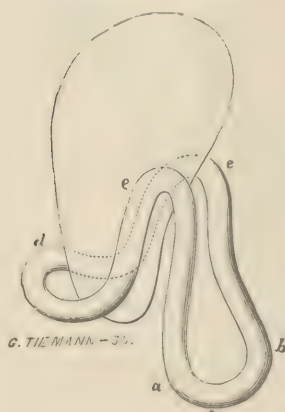


FIG. 3493.—Thomas' Anteversion Pessary.

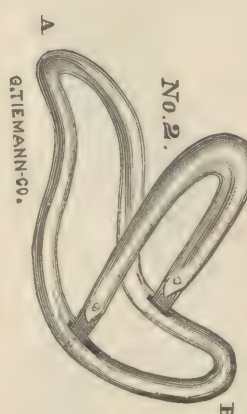


FIG. 3494.—Fowler's Bow Pessary.



FIG. 3495.—Hunter's Pessary.



FIG. 3496.—Hitchcock's Anteversion Pessary.



FIG. 3497.—Woodward's Pessary.

Fig. 1.



FIG. 3498.—Woodward's Pessary.

Fig. 2.



FIG. 3499.—Gehring's Anteversion Pessary.



FIG. 3500.—Skene's Cystocele Pessary.

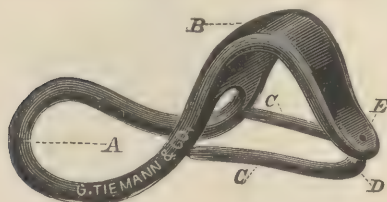
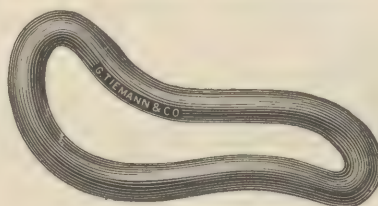


FIG. 3501.—Emmet's Smith's Pessary.



GYNÆCOLOGICAL.

UTERINE MALPOSITIONS, DISPLACEMENTS.

Supports, Pessaries, Hysterophores.

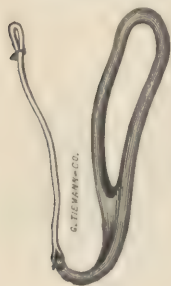
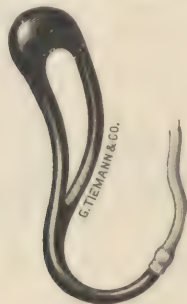
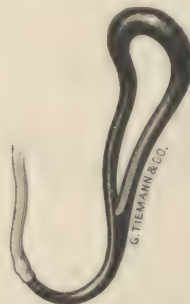
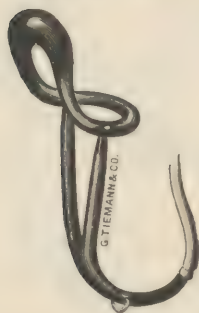
FIG. 3502.
Cutter's Pessary.FIG. 3503.—Thomas' Cutter's
Retroversion Pessary.FIG. 3504.—Thomas' Cutter's
Anteversion Pessary.FIG. 3505.—Thomas' Cutter's
Anteversion Pessary, with
cervical rest.FIG. 3506.—Thomas' Cutter's
Anteversion Pessary.FIG. 3507.—Thomas Cutter's
Retroversion Pessary, with
cervical rest.

FIG. 3508.—Smith's Pessary.



FIG. 3509.—Side view of Smith's Pessary.

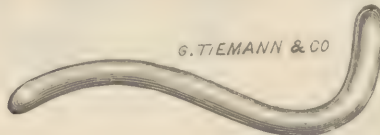
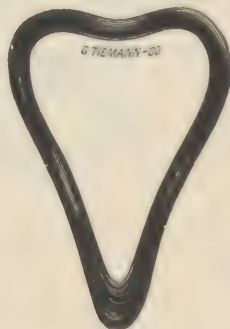
FIG. 3510.
Buttles' Pessary.

FIG. 3511.—Buttles' Pessary.

FIG. 3512.
Thomas' Retroversion Pessary.

GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

Supports, Pessaries, Hysterophores.

FIG. 3513.—Thomas' Ante-
flexion Pessary (open) when *in situ*.

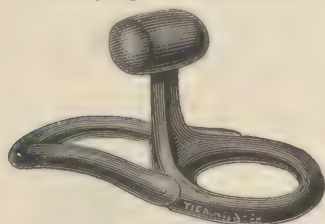


FIG. 3514.—Thomas' Retro-
flexion Pessary.



FIG. 3515.—Thomas' Ante-
flexion Pessary (closed).

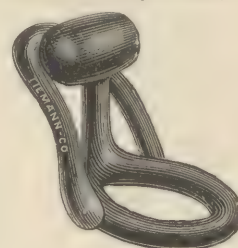


FIG. 3516.—Thomas' Ante-
version Pessary (open).



FIG. 3517.—Hanks' Pessary.

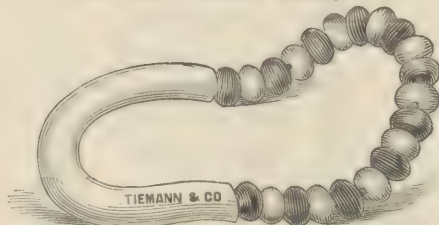


FIG. 3518.—Thomas' Ante-
version Pessary (closed).



FIG. 3519.
Bozeman's Smith's Pessary.



FIG. 3520.—Von Ramdohr's Pessary.

Fig 1.



Fig 2.

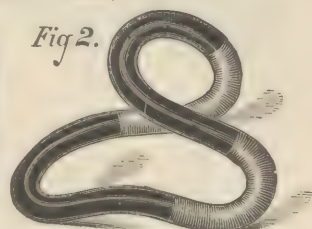


FIG. 3521.
Cole's Retroversion Pessary.



FIG. 3522.—Cole's Anteversion Pessary.

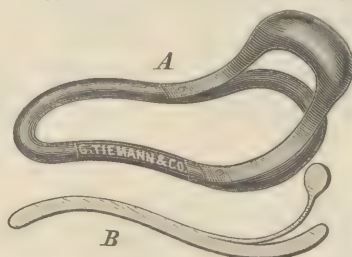


FIG. 3523.
Carroll's Retroflexion Pessary.

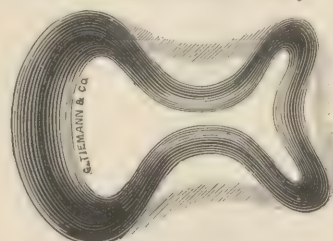


FIG. 3524.—Thomas' Ante-
version Pessary.



FIG. 3525.—Kinloch's Pessary for
Prolapsus of the Bladder.

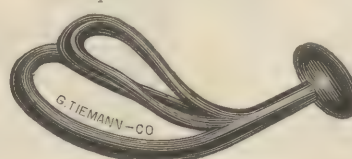


FIG. 3526.
Kinloch's Anteversion Pessary.



GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

Stem Pessaries, Repositors, Hysterophores.

"*Intra-Uterine Pessary, Stem Pessary.*—An instrument for rectifying uterine displacements—as anteversion and retroversion—consisting of a stem which is introduced into the uterus; this stem is attached to a flattened ovoid bulb or ball, on which the cervix uteri rests. Connected with this is sometimes an external part or wire frame, which is attached, at one extremity, to a flat tubular portion, passing into the vagina, to be fixed to the intra-uterine portion. The wire frame is made to press upon the pubis, so that the pessary can be kept in position *in utero*."—DUNGLISON.

FIG. 3527.—Stem Pessary.

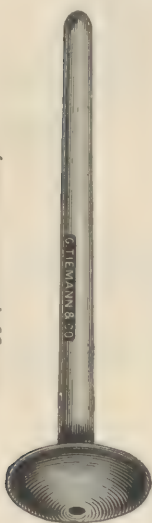
FIG. 3530.
Cole's Galvanic Pessary.FIG. 3534.
Coxeter's Stem Pessary.

FIG. 3531.—Stem Pessaries.



FIG. 3535.—Peaslee's Stem Pessary.

FIG. 3528.
Conant's Intra-Uterine Stem Pessary.

FIG. 3532.—Stem Pessary.

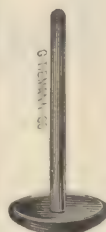
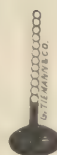
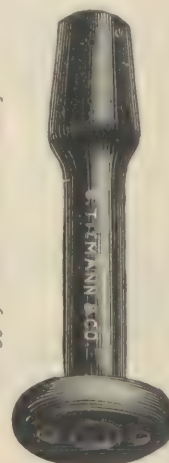
FIG. 3533.—Thomas'
Galvanic Stem Pessary.FIG. 3536.—Mossman's
Intra-Uterine Stem Pessary.

FIG. 3529.—Ball's Stem Pessary.



GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

Supports, Stem Pessaries, Hysterophores.

FIG. 3537.—Sims' Stem Pessary.

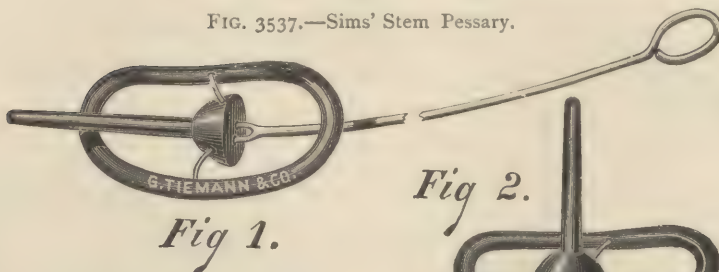


FIG. 3538.—Wilhoff's Stem Pessary.



FIG. 3539.—Donaldson's Flexion Pessary.

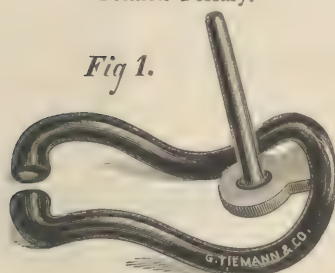


FIG. 3540.—Donaldson's Flexion Pessary, in position for insertion.

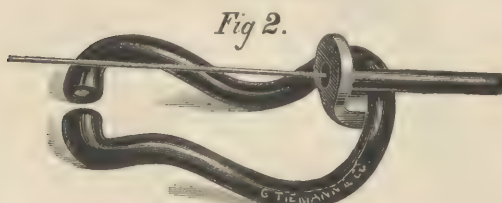


FIG. 3541.—Chambers' Stem Pessary.

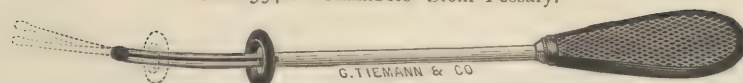


FIG. 3542.—Edward's Stem Pessary.

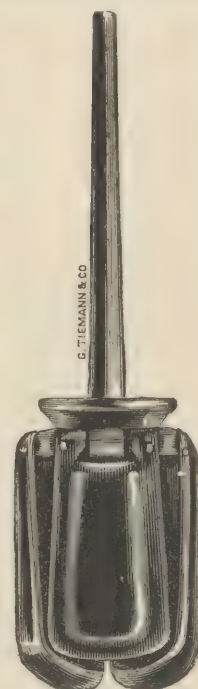


FIG. 3543.—Kinloch's Retroflexion Pessary.

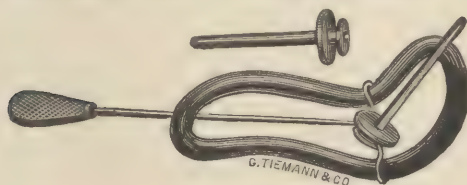


FIG. 3544.—Kinloch's Retroflexion Pessary.



FIG. 3545.—Thomas' Intra-Uterine Stem Pessary, for Antelexion.

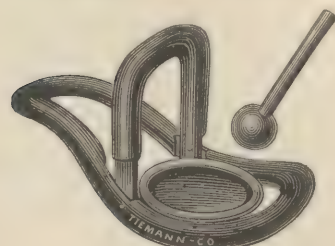


FIG. 3546.—Weber's Pessary.



GYNÆCOLOGICAL.

UTERINE. MALPOSITIONS, DISPLACEMENTS.

FIG. 3547.—Wallace's Spring Tent. **Stem Pessaries and Repositors.**

A straight spring is incarcerated in a sponge and compressed so as to retain the curved form as long as it is dry. When passed into the flexed uterus the sponge softens, the spring erects itself and straightens the uterus.

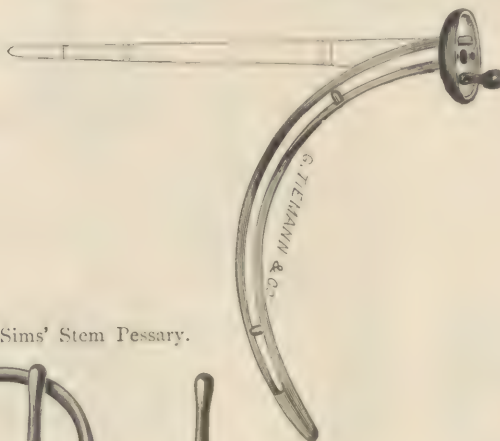
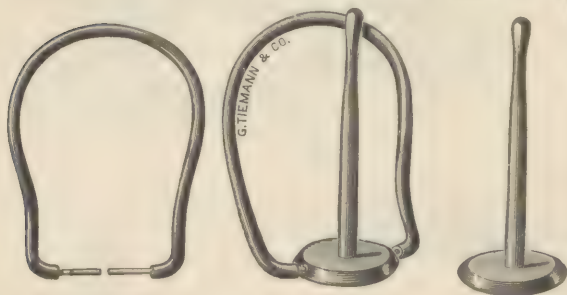
FIG. 3548.
Van de Warker's
Anteflexion Pessary.FIG. 3549.
Perry's Instrument for Flexion of the Uterus.FIG. 3550.
Van de Warker's
Retroflexion Pessary.

FIG. 3551.—H. Marion Sims' Stem Pessary.



VAN DE WARKER'S PESSARIES.—“An intra-uterine stem must be made with reference to a few principles which I believe to be unalterable. First, the stem must be shorter than the cavity of the uterus, and so small in diameter that neither the outer nor inner os is stretched or occluded. Secondly, it must be supported wholly from within the vagina.

Thirdly, the retaining part must be of such a size that it will not interfere with the action of the bladder or rectum, or with the comfort of the patient; and, lastly, the retaining part must be of such a form and so adjusted to the vagina that it will not restrict the normal uterine mobility. In order to comply with the latter condition, we cannot limit ourselves to any one form of the retaining part. *Anteflexion*, like all forward displacements of the uterus, is the most difficult to replace and retain comfortably in position. The vaginal part differs materially from that of the retroflexion form. Fig. 3548 shows the form of the anteflexion flange. The *retroflexion flange* has large fenestra cut out of the solid portion, which gives the flange superior retaining power and affords ready exit to the secretions of the cervix. This form generally converts a retroflexion into a retroversion, but, after years of work with this instrument, I have come to the conclusion that this is better than to further complicate the instrument by attachments to correct the resulting version. It will happen now and then that the flange and stem will get displaced. The remedy is a very simple one—replace them, remembering that if a stem is so securely held in place by the vaginal attachment that it cannot become displaced, it is probably too good a ‘fit,’ and the patient cannot wear it.”—*Philadelphia Medical News*, February 21, 1885. Ely Van de Warker, M. D.

“Dr. H. M. Sims exhibits a hard rubber pessary of his own devising, adapted to cases of retroversion in which the cervix uteri is very short. It consists of a straight stem, to the base of which is attached a ring having the shape of the posterior half of a Hodge pessary. At the points where the ends of the rings join the base of the stem are two peculiar bends, or shoulders, of such a shape that when a downward pressure is exerted upon the stem, the ring is tilted upwards. The instrument is adjusted by exposing the cervix through a Sims' speculum, pulling the anterior lip downwards and forwards, and at the same time slipping the end of the stem into the os. As soon as the weight of the uterus rests upon the disk forming the base of the stem, the ring is thrown forwards against the symphysis, where it takes its *point d'appui*, pressing the cervix backwards, and thus everting the uterus.”—“Transactions of the Obstetrical Society of New York.” Stated meeting, April 6th, 1886.

GYNÆCOLOGICAL.

UTERINE FIXATORS.

Tenacula, Tenaculum Forceps, for Holding the Uterus Steady during Operations.

FIG. 3552.—Tenaculum for Nott's Speculum.



FIG. 3553.—Hanks' Tenaculum Forceps.

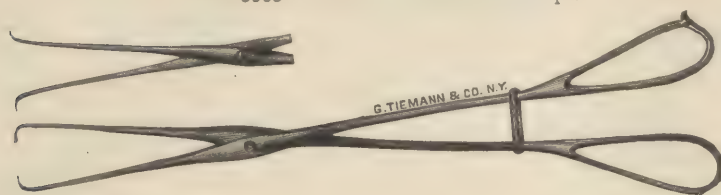


FIG. 3554.—Wylie's Tenaculum Forceps.

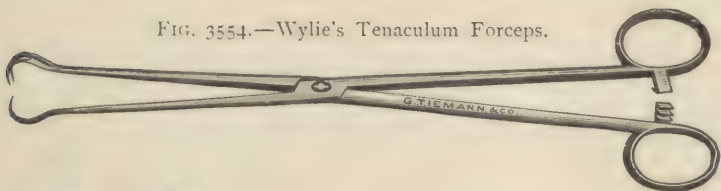


FIG. 3556.
Byrne's Double Tenaculum Forceps.

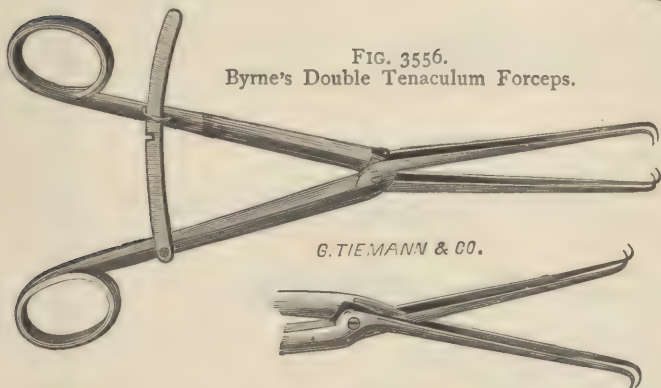


FIG. 3557.—Wooster's Tenaculum Forceps.

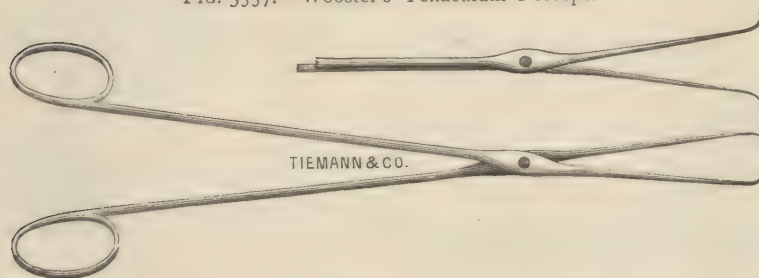


FIG. 3558.—Emmet's Double Tenaculum.

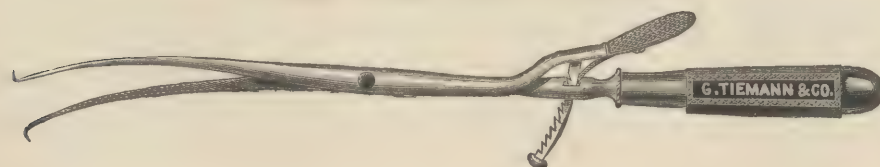


FIG. 3555.—Byrne's Uterine Fixator.



See "TENACULA," page 449.

Useful for seizing and holding steady the cervix uteri for examination, and during operations through the speculum.

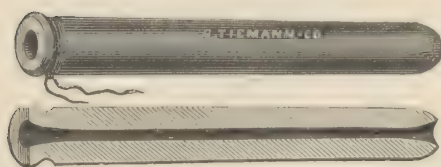
FIG. 3559.—Sims' Double Tenaculum.



GYNÆCOLOGICAL.

UTERINE DILATORS.

For Gradual Dilatation of the Uterine Canal.

FIG. 3560.
Sussdorff's Tupelo Dilators (Hollow).

SUSSDORFF'S
TUPELO (NYSSA) DILATORS,
for Dilatation of
the Os and Cervix Uteri.
Process of manufacture patented,
May 17, 1882,
by George Tiemann & Co.

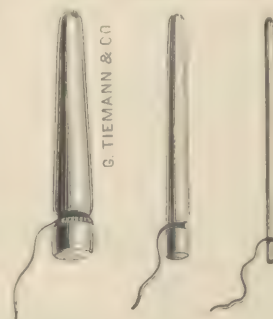
FIG. 3561.
Tupelo Dilators (Solid).

FIG. 3562.—Wallace's Spring Tent.



FIG. 3563.—Sponge Tent Expeller.

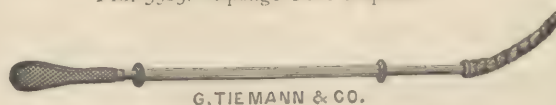


FIG. 3564.—Sponge Tent Expeller.

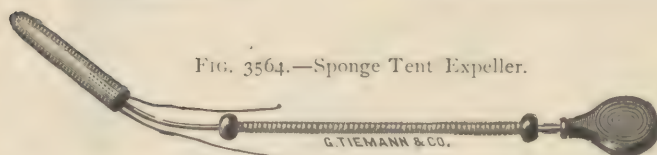


FIG. 3565.—Willhoft's Tent Expeller.



SPONGE TENT EXPELLER.—When the tent is *in situ* the stilet is withdrawn and the unsupported tent is left in the uterine canal.

FIG. 3566.—Campbell's Intra-Uterine Stem.

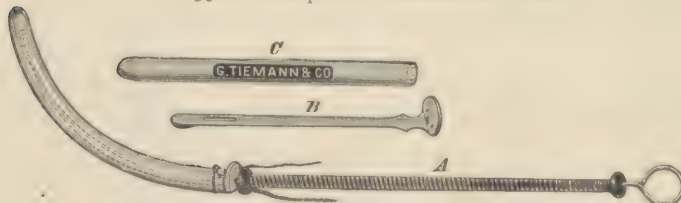
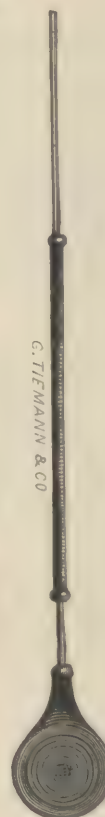


FIG. 3567.—Sponge Tent Expeller.



"Gradual dilatation is accomplished by porous substances, shaped to fit the uterine canal, which gradually swell through imbibition of the fluids from the surrounding tissues. These are called uterine tents. Tents are made of sponge, laminaria, tupelo, slippery elm bark, &c.

"Sussdorff's tupelo (tent) dilator absorbs fluids rapidly and expands to at least double its compressed size; when expanded its surface is, although not perfectly smooth, not sufficiently rough to injure the mucous membrane during its removal; it does not favor decomposition of fluids—indeed, I have never found a tupelo tent to possess the slightest offensive odor after having been left in utero over twelve hours."—"Minor Surgical Gynæcology." Mundé.

GYNÆCOLOGICAL.

UTERINE DILATORS.

For Rapid Dilatation of the Uterine Canal.

FIG. 3568.—Simpson's Uterine Dilators.

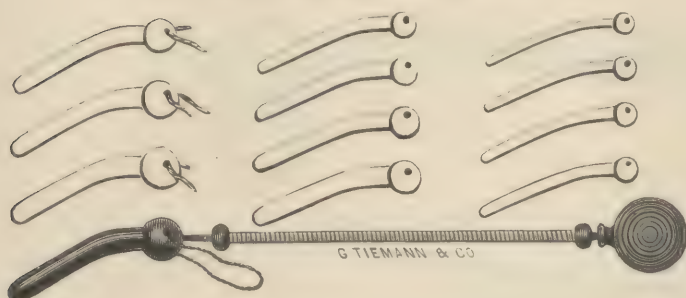


FIG. 3569.—Peaslee's Uterine Dilators.

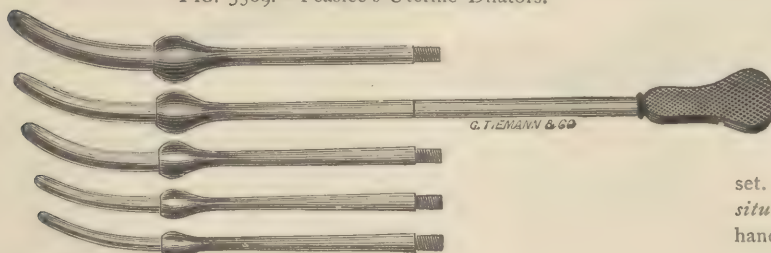
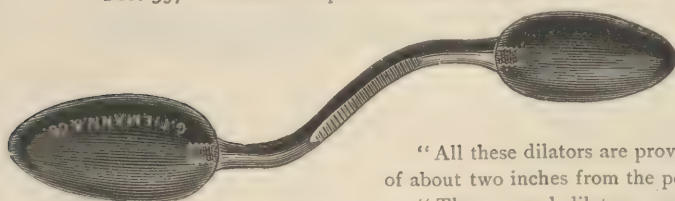


FIG. 3570.—Hank's Uterine Dilator.



FIG. 3571.—Hank's Rapid Uterine Dilators, set of ten.



"There are two methods of dilating the uterine canal without knife or scissors, and they differ simply in the degree of rapidity with which the dilatation is accomplished.

"*Dilatation* is effected by means of graduated sound-like instruments, which are forced through the uterine canal one after the other; or by steel two- or three-branched instruments, which are introduced closed, and then expanded by an external mechanism; or by tubes or bags of rubber which are inserted in a collapsed condition, and are then inflated with air or water; or by the finger.

"*Graduated Sounds.*—The dilators of Simpson (Fig. 3568) are twelve in a set. They were designed to be left *in situ* for an hour or more, and the handle is therefore provided with a slide by which the dilator can be detached when it has been introduced. A tampon keeps it in place, and it is withdrawn by the string attached to it.

"In 1870 the late Dr. E. R. Peaslee devised a series of graduated metal sounds, which are arranged to screw into one handle (Fig. 3569). There are either three or five in a set. Later these are also made of hard rubber.

"Dr. Horace T. Hanks placed two dilators of different sizes on one handle, making eight sizes to constitute a set.* (Fig. 3570.)

"All these dilators are provided with a circular enlargement at a distance of about two inches from the point, to prevent their too deep insertion.

"These sound dilators are introduced through the speculum, the cervix is seized with a stout tenaculum (best a double tenaculum), and the uterus is slightly drawn down and straightened. The direction of the uterine canal being ascertained by the sound or probe, the smallest sized dilator is inserted into the os and forced upward toward the internal os, the cervix being steadily held by the tenaculum. As soon as the whole dilator has been introduced, it is allowed to remain a few moments, then withdrawn and the next size forced in, and so on until the desired degree or the limit of dilatation has been reached. The last dilator may be allowed to remain in utero for fifteen minutes or longer, or, if only temporary dilatation is desired, may be removed at once when the desired degree has been accomplished."—"Minor Surgical Gynæcology." Mundé. 1885.

"For the *rapid dilatation* of an already partly dilated cervical canal, as at the beginning of a miscarriage, or in rigidity of the external os during labor term, or for the removal of intra-uterine polypi and fibroids, Dr. Hanks has had constructed a series of much larger olive-shaped dilators of hard rubber (Fig. 3571). They are designed to take the place of elastic rubber obstetric dilators, which often burst and are liable to spoil. In using these dilators it is absolutely necessary to have a strong tenaculum-forceps in order to firmly fix the cervix." (See Fig. 3553.)

* The set may increase in number *ad libitum*.—G. T. & Co.

GYNÆCOLOGICAL.

UTERINE DILATORS.

Specula for Rapid Dilatation and Ocular Examination.

FIG. 3572.—Tiemann & Co.'s Intra-Uterine Speculum.



FIG. 3573.—Elliott's Intra-Uterine Speculum.



Forcible and Rapid Dilatation of the Cervix Uteri; for the Relief of Stricture, Conical Os, Flexions, Sterility, &c.

"Dr. Ball's description of the operation is as follows: First, introduce a metal bougie as large as the canal will admit, followed in rapid succession by others of larger size, until a No. 7 is reached, which is the size of Ball's dilator; then introduce the dilator and stretch the cervix in every direction until it is sufficiently enlarged to admit a No. 20 bougie, or more if necessary; then introduce a gum elastic uterine pessary of about that size and retain it in position by a stem secured outside of the vulva for about eight days, during which time it has done its work and is ready for removal. During this time keep the patient perfectly quiet upon her back.

"By this operation all adhesions are broken and a radical change in the nutrition of the whole organ takes place, all abnormal sensibility and pain passing away."—H. H. Tinker, M. D., in *New York Medical Times*, April, 1882.

FIG. 3574.—Ball's Original Dilator.



FIG. 3575.—Ball's Modified Uterine Dilator.

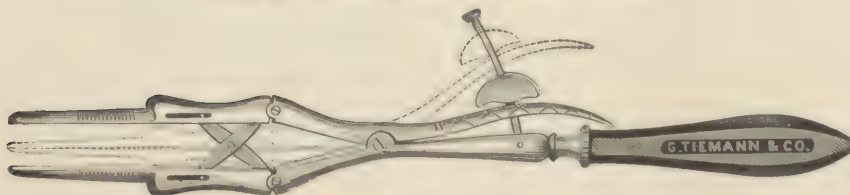
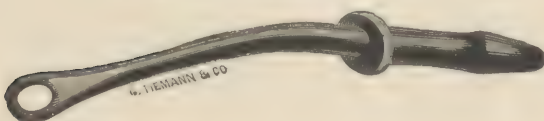


FIG. 3576.—Ball's Stem Pessary.



See "BALL'S SPECULUM,"
Fig. 3185.

FIG. 3577.—Ball's Stem Pessary.



GYNÆCOLOGICAL.

UTERINE DILATORS.

For Rapid Dilatation of the Uterine Canal.

FIG. 3578.—Ady's Uterine Dilator.



FIG. 3579.—Simpson's Uterine Dilator.

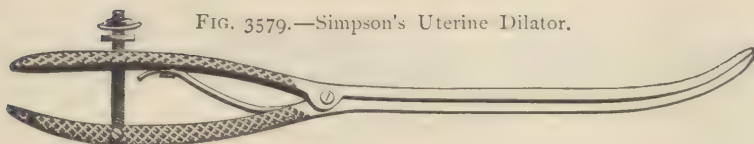


FIG. 3580.—Thomas' Uterine Dilator.

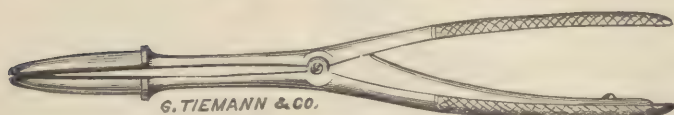


FIG. 3581.—Nott's Uterine Dilator.

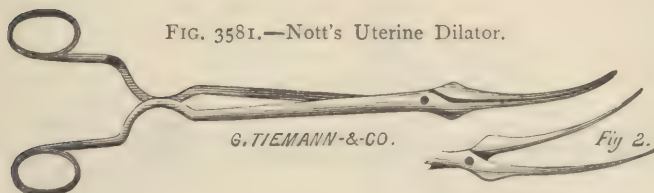


FIG. 3583.—Wessinger's Uterine Dilator.



FIG. 3584.—White's Uterine Dilator.

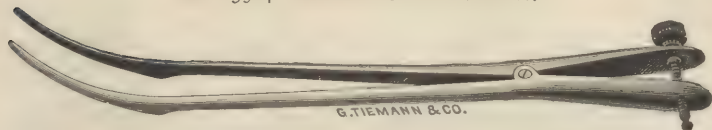


FIG. 3585.—Tiemann & Co.'s Intra-Uterine Speculum.

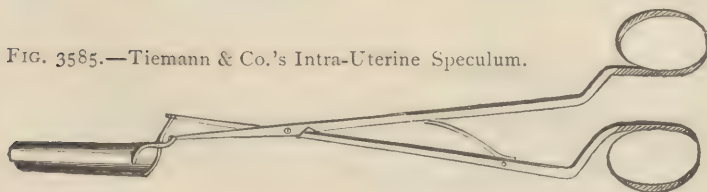
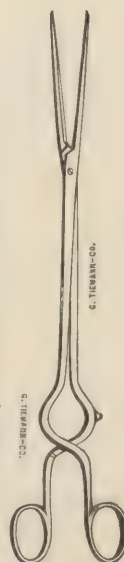


FIG. 3582.—Hunter's Uterine Dilator.



FIG. 3586.—Atlee's Uterine Dilator.



GYNÆCOLOGICAL.

UTERINE DILATORS.

For Rapid Dilatation of the Uterine Canal.

FIG. 3587.—Sims' Uterine Dilator.

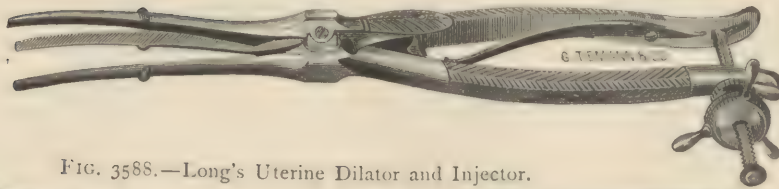


FIG. 3588.—Long's Uterine Dilator and Injector.



FIG. 3589.—Ellinger's Uterine Dilator.

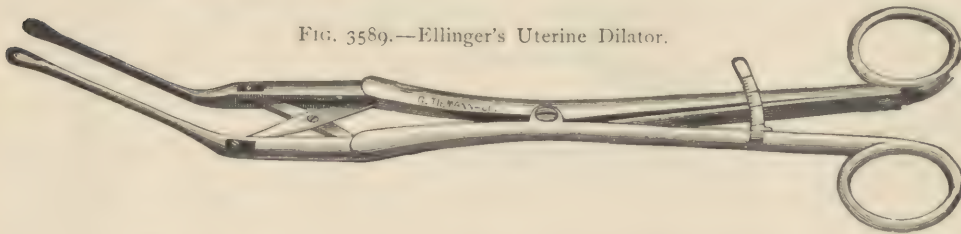


FIG. 3590.—Miller's Uterine Dilator.

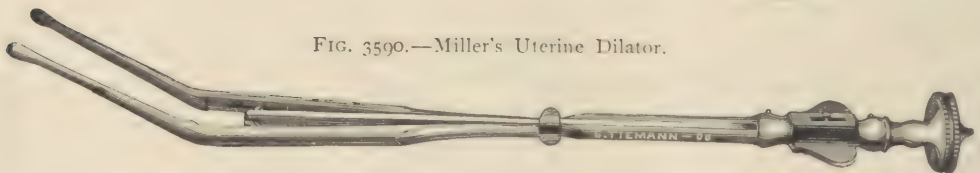


FIG. 3591.—Nelson's Uterine Dilator.



FIG. 3592.—Howard's Uterine Dilator.

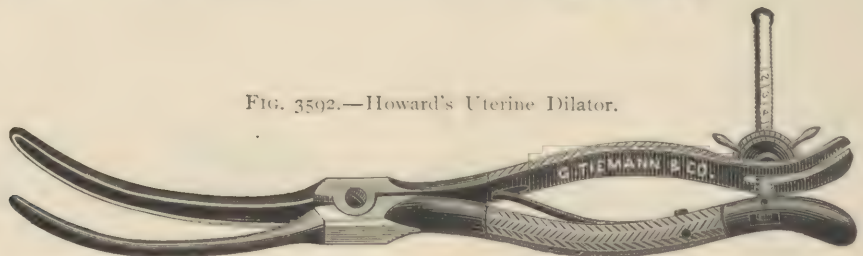
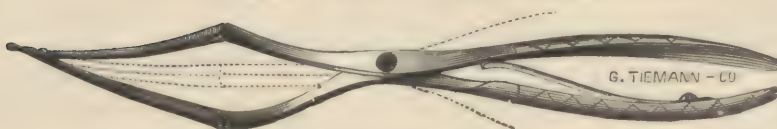


FIG. 3593.—Vanderveer's Uterine Dilator.



GYNÆCOLOGICAL.

UTERINE DILATORS.

For Rapid Dilatation of the Uterine Canal.

FIG. 3594.—Palmer's Uterine Dilator.

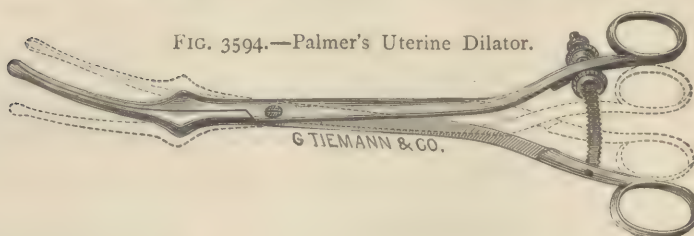


FIG. 3595.—Ellinger's Uterine Dilator.



FIG. 3596.—Goodell's Uterine Dilator.

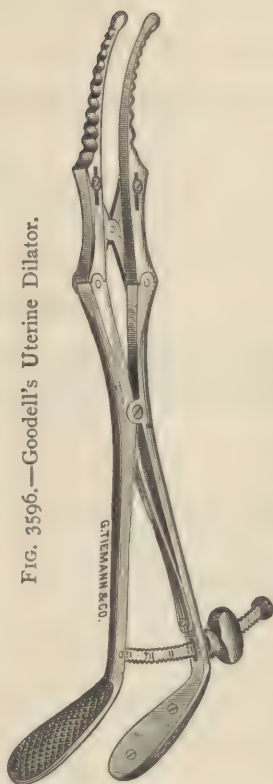


FIG. 3597.—McLean's Dilator and Introducer.

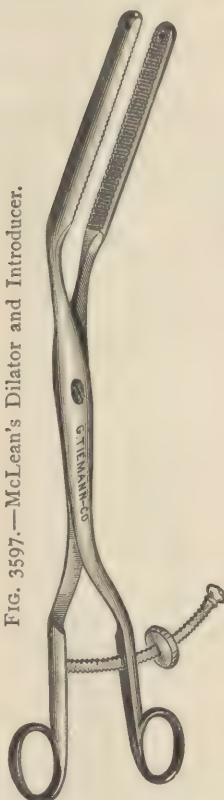
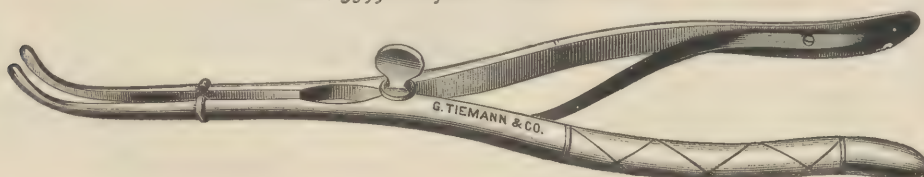


FIG. 3598.—Palmer's Uterine Dilator (latest).



Dr. Goodell recommends two dilators of different sizes with parallel action of their blades. The smaller of these has slender blades, and it pilots the way for the other, which is more powerful. He had the beaks of these dilators changed from an obtuse angle to a slight curve, so that it can be reversed within the womb. The light instrument needs only a ratchet in the handles, but the stronger one should have a screw with which to bring the handles together. Lest the beak should hit the fundus uteri, and seriously injure it when the instrument is opened, the blades are made no longer than two inches, and are armed with a shoulder which prevents further penetration.

FIG. 3599.—Wylie's Uterine Dilator.



GYNÆCOLOGICAL.

UTERINE DILATORS.

For Rapid Dilatation of the Uterine Canal.

FIG. 3601.—Climax Uterine Dilator.

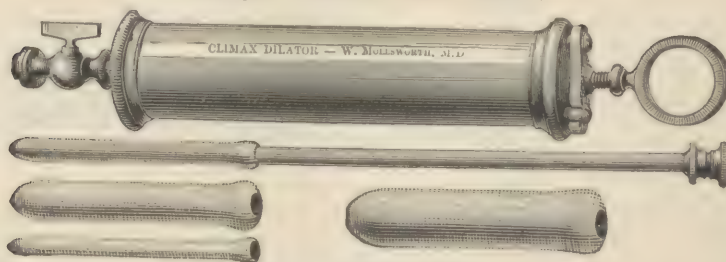


FIG. 3602.—Ohr's Dilator and Corrector.

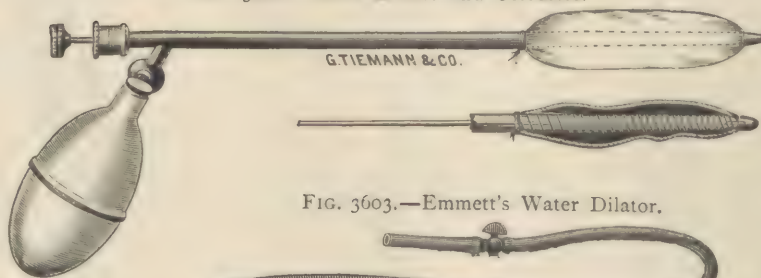


FIG. 3603.—Emmett's Water Dilator.

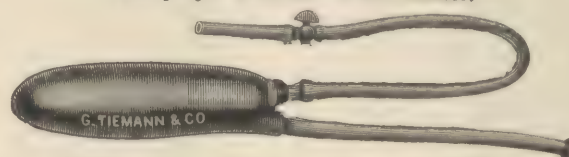


FIG. 3605.—Barnes' Dilators.

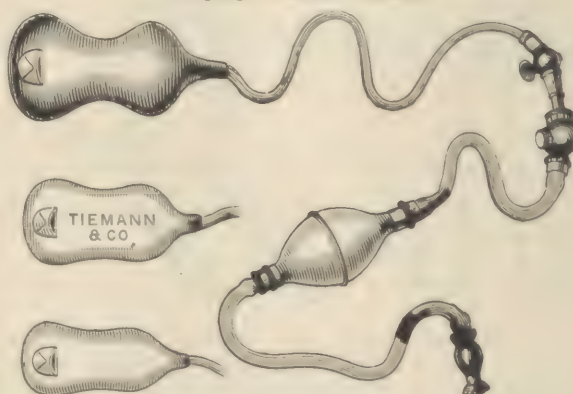


FIG. 3606.—McLean's Modification of Barnes' Dilator.

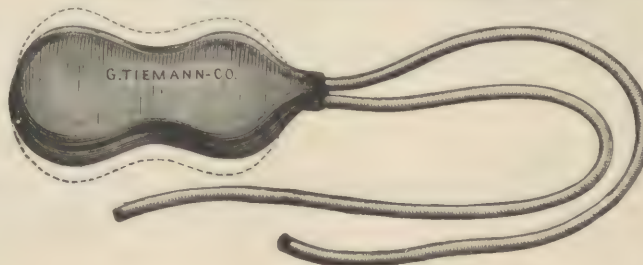


FIG. 3600.—Emmett's Sponge Dilator.

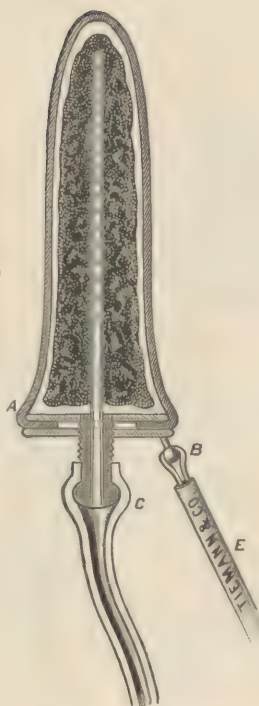
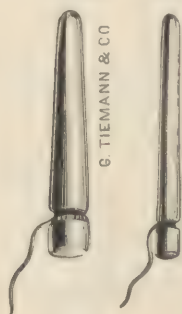
FIG. 3604.
Sponge Tents.

FIG. 3607.—Cowan's Uterine Dilator.

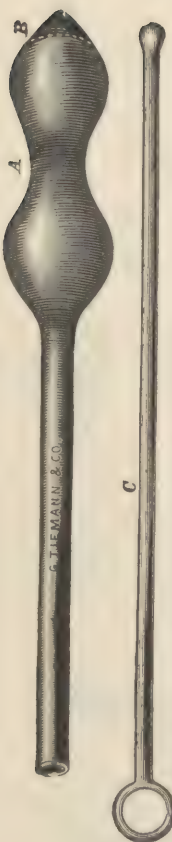


Fig. 3606 consists in a duplication of the bag and tube so that one side may be distended independently of the other, and requires but one insertion; the bag has no extra pocket on the outside. There need be only two sizes used, and Dr. McLean always uses carbolized hot water for filling them. The bag is introduced by doubling it upon itself, seizing it with the curved jaws of a forceps (Fig. 3597).

GYNÆCOLOGICAL.

UTERINE, STENOSIS, HYSTEROTOMY, TRACHELOTOMY.

Hysterotomes, Metrotomes, Uterotomes, Scissors, for Incising the Cervical Canal.

FIG. 3609.—Simpson's Hysterotome or Metrotome.



FIG. 3610.—Thomas' Uterine Double Scissors.



FIG. 3611.—Bozeman's Angular Scissors.

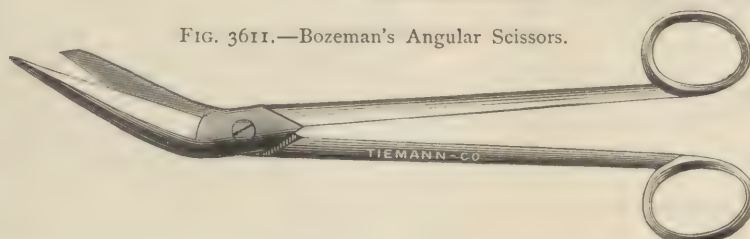


FIG. 3612.—Stohlmann's Hysterotome.

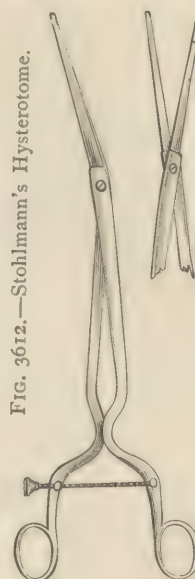


Fig. 3608.—White's Hysterotome.



"The hysterotome is an instrument for incising the interior of the cervical canal. It is occasionally needed in stenosis of the cervix; its use must, in these cases, be followed by the daily introduction of the bougie smeared with vasiline, to prevent the adhesion of the cut surfaces and the consequent diminution of the size of the cervical canal."—"Diseases of Woman." Eaton. 1880.

"In 1843 Professor Simpson, of Edinburgh, advocated and practiced cutting through the walls of the cervix and thus gaining space without dilatation. He employed a single-bladed hysterotome, represented in Fig. 3609.

"This instrument is introduced without a speculum, the patient lying on her left side. The hysterotome, with its blade concealed, is guided by the index finger up to, and, if necessary, as is very rarely the case, through the os internum. If the cervical canal be too small to admit it, previous dilatation should be practiced by tents. Being placed in position the blade is thrown out, the force being increased as it is withdrawn to the os externum. By thus increasing the pressure upon the handle of the blade, the incision is made wider at the lower than at the upper part of the canal. The instrument is then reintroduced and the other side incised in a similar manner, and the surface is brushed over with the solution of persulphate of iron. To accomplish the incision of both sides simultaneously, a number of double hysterotomes have been devised with two blades instead of one. A very simple one, devised by Mr. Stohlmann of this city, is represented by Fig. 3612."—"Diseases of Women." Thomas.

"Sims' method consists of the following steps: 1st. The patient is placed on the left side and the speculum introduced; 2d. The uterus being fixed by a tenaculum, one wall of the cervix is cut with a pair of long scissors, one blade of which is passed into the cervical canal until the other reaches nearly to the vaginal junction. In like manner the other wall is incised.

"I have so often found the slit in the posterior wall heal up for a great part of its extent some months after the patient has passed out of observation, that I now resort to a different procedure. By means of the double scissors (Fig. 3610) I cut by one stroke a strip of tissue one-quarter of an inch wide, and extending from the os externum to the vaginal junction. Having removed this I then cut, by the same instrument, a small piece out of the upper extremity of the incision. Then a knife should be slid up, so as to make a straight and unobstructed canal."—THOMAS.

FIG. 3613.—Peaslee's Uterotome.



"*Superficial Trachelotomy.* (Peaslee's Operation).—For relieving sterility, Dr. Peaslee devised and practiced an operation, which consist in merely cutting through the external or internal os, or both, if constricted, to a depth sufficient to make the canal of the average width of a parous woman. According to Peaslee, if the external os does not easily admit a sound one-sixth of an inch in diameter, there is stenosis as to conception.

GYNÆCOLOGICAL.

UTERINE PLETHORA.

Scarifying, Cupping and Leeching.

FIG. 3614.—Buttles' Scarifyer and Tenaculum.



FIG. 3615.—Chapman's Uterine Scarificator.



FIG. 3616.—Probe Pointed Uterine Knife.

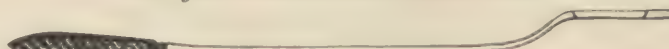


FIG. 3617.—Lenneker's Uterine Knives.



FIG. 3618.—Skene's Sound and Scarificator.

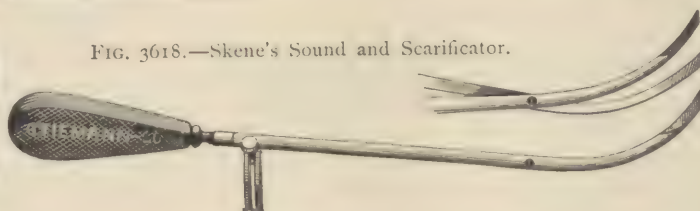


FIG. 3619.—Thomas' Dry Cupper.



FIG. 3620.—Reese's Uterine Leech and Aspirator.



FIG. 3621.—Chapman's Uterine Scarificator.



FIG. 3622.—Storey's Uterine Scarificator.

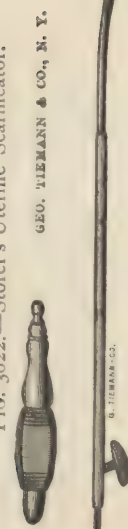
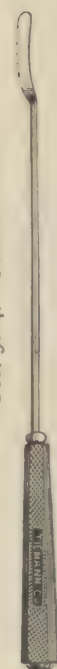


FIG. 3623.—Buttles' Scarificator.



FIG. 3624.—Uterine Knife.



"Should scarification be employed, a very sharp and narrow bistoury or tenotomy knife may be introduced within the os and drawn outward towards the vaginal edges of the cervix, so as to sever all the superficial vessels over which it passes. I would recommend, in preference to this plan, the use of Dr. Buttles' spear-pointed scarificator; this, when plunged about one-sixteenth of an inch into the cervix and given a rapid half-turn before removal, causes a very free flow of blood should congestion exist. If a sufficient flow does not occur from three or four of its punctures, this can be caused by *dry cupping* the cervix by a very simple instrument, made of vulcanite, which is introduced through the speculum, the medium size of the cylindrical variety being large enough to admit it. Being passed up to the cervix, the piston is retracted, and, so perfect is the working of these instruments, when constructed of vulcanite, that a perfect vacuum is produced. By using this for a few minutes, and then puncturing with Buttles' spear, from two to four ounces of blood may readily be drawn. The exhaustor should not be used after puncturing, but before. All that will be necessary afterwards will be to pass a moist sponge, attached to a sponge-holder, over the punctured surface, so as to prevent clotting in the mouths of the bleeding vessels."—"Diseases of Women." Thomas,

See ARTIFICIAL LEECHES, page 116.

GYNÆCOLOGICAL.

UTERINE. TUMORS, POLYPI.

Galvanism.

"By stimulating the trophic nerves to greater activity, the constant galvanic current has caused retrogressive changes in these tumors. I look upon this agent as one yet in its infancy, and as one from which much may in the future be expected in the treatment of fibroid tumors."—"Lessons in Gynæcology." Page 300. Goodell.

The merits of this battery are *constancy, durability, portability and general convenience.*

FIG. 3625.—Barrett's Chloride of Silver Battery.

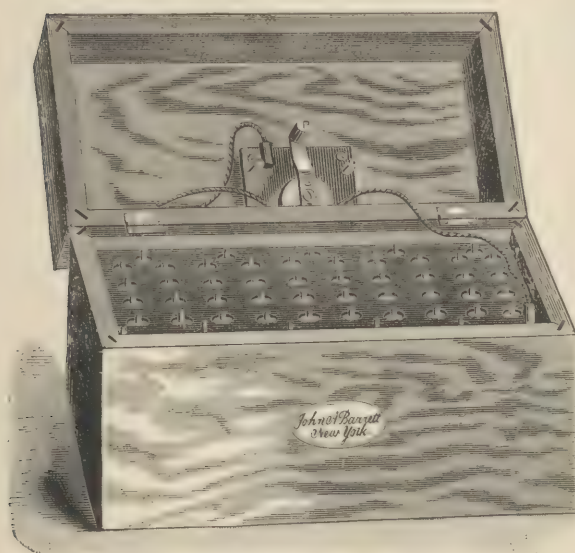
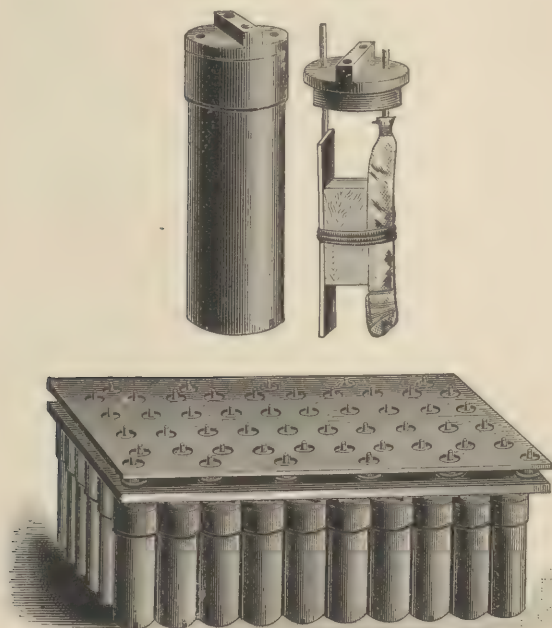


FIG. 3626.—Elements.



Constancy.—The strength of the current is absolutely constant. The battery is not weakened by work. The power to furnish the required quantity of electricity is stored up in the stable and insoluble compound, chloride of silver, and so long as the smallest portion of this remains upon the silver plate the chemical relations of the elements remain unchanged, and the electro-motive force of the battery is undiminished.

The quantity and quality of the current which the battery will give after six months' or a year's service, in fact up to the time when the metallic elements are entirely reduced, are found to be the same as when the battery is first used.

Durability.—It is found by actual experience that the battery will do all the work of an active practitioner, for at least two years, without requiring a renewal of the elements. The battery does not waste when not used, as the zinc and chloride of silver are insoluble in the fluid, and remain untouched by it so long as the battery remains on open circuit. When the battery is put to work and a current of electricity is drawn from it, certain regular and well defined chemical changes take place which are in exact proportion to the work done.

The connections of the battery are entirely free from corrosion. The silver wires which are attached directly to the zinc and silver plates in the cells are passed up through the caps and plate, and fastened down under nuts which screw upon the connecting studs. There are no connections underneath the plates. The nuts and ends of the silver wires are on the top of the plate, easy of access, and entirely removed from moisture or the fluid of the cells.

Portability.—The battery is the most portable in every respect—the lightest, the smallest, the neatest and most convenient known for medical purposes, or for any other purpose for which such a galvanic apparatus may be used. A fifty cell battery measures 7 x 7 x 12½ inches, and weighs, with electrodes, 13 pounds. The elements remain permanently in the fluid, which is non-corrosive, and the cells are hermetically sealed. The battery is shipped with perfect safety by express, ready charged with the fluid. The battery can be packed in a trunk for traveling, or carried in any of the ordinary ways in which baggage is transported, without danger of spilling or damage.

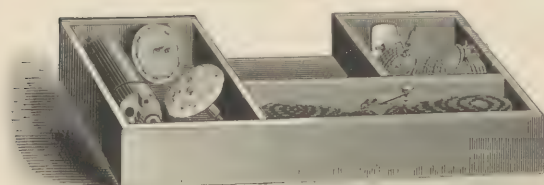
Convenience.—To use the battery it is necessary only to open the cover, connect the electrodes, and

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UTERINE. TUMORS, POLYPI.

Galvanism. (Continued.)

FIG. 3627.—Electrodes.



select the number of cells desired. A current reversing switch is provided in the cover of the box. A handsome tray of electrodes is a part of each complete battery. The elements are permanently in the fluid, and do not require to be raised and lowered as in acid batteries. The fluid does not need to be changed during the life of the metallic elements, that is for two years or more of regular medical work. There is no gas or odor about the battery, either when in use or idle. The zincs do not require amalgamation.

The parts and connections do not corrode, nor need repairs of any sort. In short, all the annoyances which are so familiar to the users of bichromate and acid batteries are entirely absent from this form of battery.

We ship the battery, charged ready for immediate use, to any address.

The Care and Use of the Battery.—In using the battery screw the electrodes to the handles, and attach the cords to the handles and the posts on the current reverser. The binding posts have no screws, but are in the form of split clips, into which the tips of the cords are pinched firmly, always securing good connections. Select the desired number of cells by means of the hollow plugs at the ends of the short cords and the numbered connecting studs. It is recommended to use the cells as uniformly as is convenient, that is, to count backward from the upper end of the battery a part of the time, instead of always using the cells at the lower end.

The only precaution to be observed is not to put the battery to extra and accidental work, by which the material is wasted without doing its regular work. Any moist or metallic article laid upon the connecting studs provides a path for the escape of the electricity between all the cells which are thus connected. Also, when the conducting cords are connected to the battery, care should be taken not to lay them together so that the current can pass directly through them, for a direct contact or, as it is called, a short circuit, of this sort gives the entire battery a large amount of wasteful and unprofitable work to do. By observing a little care in these respects, entire satisfaction with the battery is guaranteed.

Renewal of Battery.—After the elements have furnished the full amount of the electricity stored up in them, the original composition of silver is reduced to a solid plate of pure metallic silver. This applies towards the cost of new plates. The reduced plates may be readily removed and new plates substituted. The cost of a new silver plate is thirty-two cents; the value of the worn-out silver plate is twelve cents; the cost of a new zinc is two cents; the actual cost of a pair of new plates is thus twenty-two cents. These plates will be supplied in sets by us on these terms. If the batteries are sent to us we will make no charge for the labor of renewing.

On these terms this battery is very economical, our experience with it enables us to assure satisfaction to every purchaser.

FIG. 3628.
Absolute-Current Meter.

This instrument is designed to fill a want amongst the medical profession, which a closer and more scientific study of the uses of galvanic electricity has made apparent. The prevalent method of measuring and designating the current applied to the body has been by the number of cells of battery employed. This is altogether a simple and convenient way, but its uncertainty and indefiniteness render it not only misleading to the practitioner, but have obstructed the progressive study of the subject, and have kept this department of medicine below the level of accuracy and general usefulness to which it is capable of rising. The meter eliminates these elements of uncertainty, and puts the application of galvanism upon a basis of exact measurement.

The instrument is of the class of absolute galvanometers, and has its scale graduated in units of current strength, so that the movements of the index show in these units the absolute strength of current passing through the meter.

For use in measuring the electricity in medical application, the meter is to be so connected in the circuit that all the current which passes through the body of the patient goes also through the meter. In this situation the deflection of the index gives figures, which are the measure of the current strength which flows freely through the body, after having overcome the obstacles to its passage.

With the use of this meter, then, it being desired to produce a given effect upon a nerve or muscle, the number of cells of battery and the sensations of the patient would not be so much consulted, but the required number of units of current strength, or milliamperes, would be employed. The milliampere is the fractional unit of current strength

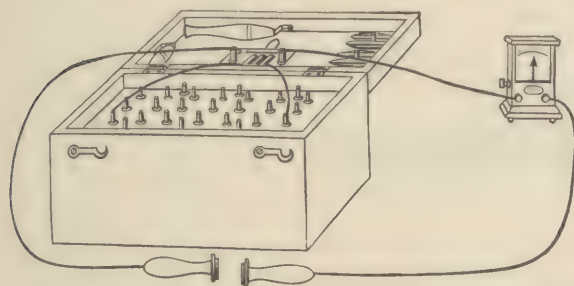
GYNÆCOLOGICAL.

UTERINE. TUMORS, POPYPI.

Galvanism. (Continued.)

derived from the primary unit, the ampere. The milliampere is one-thousandth of an ampere. The unit by which the meter is graduated is thus a common and universal standard, and is neither arbitrary nor peculiar to the instrument itself. The number of milliamperes employed in most cases are from one to twenty, while, by the use of very large electrodes, thirty or forty milliamperes may be applied to some parts of the body.

The instrument is constructed upon established scientific principles, with several devices for increasing its convenience and serviceability. The movable magnet rests upon frictionless, knife-edge bearings, and is provided with



a vane or wing of mica which checks the otherwise oscillations of the needle. The screw on the right hand is for fixing the needle when the instrument is not in use. To set the needle free give the screw half a turn to the left, and push it down to the bottom of the slot in which it slides. To fix the needle, raise the screw upward as far as it will go, and turn it to the right. The needle should always be fixed when not in use, to prevent wearing and damage to the knife-edges. The screw near the bottom on the left is for levelling the instrument.

The diagram shows the connections for using the battery and meter.

"*Galvanization* is chiefly applicable to the discussion and removal of certain tumors, diseases of the bloodvessels, chronic glandular swellings, from inflammatory exudations in and around joints, serous effusions, the formation of issues, and the treatment of rebellious sinuses, fistules and ulcers."

Electrolysis.

"The electrolytic treatment of tumors is more universally applicable, although it is far more tedious than other methods. The only instruments necessary are fine gold, or gilt steel, or other electrolysis needles and a sponge electrode. In performing the operation, the needle is passed into the interior of the growth, and attached to the negative pole of the battery, while the sponge electrode, previously wet with salt water, is connected with the positive pole and placed outside on the skin. When the tumor is small, one needle will suffice; but when it has acquired considerable volume, the *serre-fines* conductors of Dr. Althaus will prove serviceable, as it permits the introduction of several needles in any direction that may appear suitable. They should be insulated to within a short distance of their points with vulcanite, so that they may not affect the skin. Although the transmission of the current is not painful, yet, to prevent any unpleasant shock, the precaution should be taken of commencing with low power, and gradually increasing it to the full quantity that it is designed to employ. The duration of the application will vary according to the nature of the case, two or three minutes being sufficient for small tumors, while larger growths require from fifteen minutes to half an hour. The sittings may be repeated every second or third day. The number of cells, or the quantity of electricity employed, must be proportionate to the consistence of the tumor; solid goitres and scirrhus, for example, demanding from thirty to forty cells, while other growths will yield to a battery of fifteen pairs of elements.

"The best results from electrolysis have been obtained in vascular, sebaceous, and goitrous tumors, particularly the cystic variety; in chronic glandular tumors; in hydatid tumors of the liver; in hydrocele, and in stricture of the urethra. In the treatment of aneurism it has almost been abandoned; but it has proved successful in several cases of the cirroid form of the disease that have been subjected to it. Nævoid, venous, and small sebaceous tumors rarely resist the influence of the galvanic current, while the testimony of Dr. Althaus and Dr. Mackenzie is strongly in favor of it in the management of goitre, the former observer believing 'that all cases of bronchocele, however large, may be cured by electrolysis, if the treatment be persevered in for a sufficient time.' Dr. Fagge and Dr. Durham, some years ago, recorded eight cases of hydatid tumors of the liver, in seven of which, one remaining doubtful, a cure was promptly effected. Dr. Ruschenberger, of our navy, Scoutetten, and Pétrequin have cured obstinate hydroceles by introducing both electrodes into the sac; while other surgeons have successfully employed electrolysis, in similar instances, with the cathode only in the sac. The observations of Mallez and Tripier, Brenner, and others, demonstrate that good results may occasionally be anticipated from it in the treatment of stricture of the urethra."—"System of Surgery."

Gross. Vol. I. 1882.

See page 36, ELECTROLYSIS NEEDLES, &c.

GYNÆCOLOGICAL.

UTERINE TUMORS AND POLYPI.

Curettes for Removing Intra-Uterine Vegetations.

FIG. 3629.—Thomas' Curettes, three in one handle.

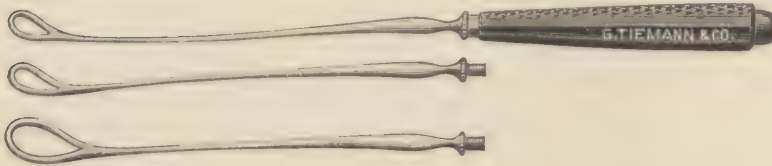


FIG. 3630.—Thomas' Curette.



FIG. 3631.—Sims' Curette.



FIG. 3632.—Sims' Curette.



FIG. 3633.—Hanks' Curette.



Vegetations of the Endometrium.

"The vascularity of the womb, its sexual and periodic congestions, the structural energy with which it is endowed, and the lesions to which it is subjected, make it peculiarly liable to be invaded by benign and by malignant growths. The most common are those which develop in the endometrium in the shape of vegetations."—GOODELL.

"While some gynecologists treat vegetations of the endometrium by application of powerful caustics, chiefly fuming nitric acid, the majority follow the lead of Sims and Thomas and remove the vegetations with the curette."—MUNDE.

Fibrous Growths of the Uterus.

"A fibrous growth has its origin within the muscular tissue of the uterus, and is generally of a dense structure, but not always, and it may or may not undergo cystic

degeneration. Such a tumor may remain as an isolated mass within the uterine tissue, being limited in growth, or it may gradually involve the greater portion of the organ, attaining an almost unlimited increase in bulk. A fibrous tumor of the uterus has been termed a '*fibro-myoma*' by Virchow, a '*fibroid*' by Rockitansky, and a '*partial hyperplasia of the uterine parenchyma*' by Klebs. While small, such a growth may be designated a fibroid; when larger, and out of the pelvis, it may be called a fibrous tumor, or a fibrous growth of the uterus, without reference to the degree of development. As an exceptional circumstance, an accumulation of fluid sometimes occurs within certain portions of these growths, and then they are said to have undergone cystic degeneration. But should this process become so extensive as to involve the whole mass, leaving but little of the fibrous element, it is then termed a fibrocystic tumor."—EMMET.

"*Fibrous Polypi*.—Nature often attempts to effect a radical cure of fibrous growths by giving them a polypoid shape, and experience has demonstrated that art can supply no safer or more effective method than that suggested by nature. The pedicle, or stalk, connecting the tumor to the uterus contains little else than small bloodvessels, a little connective tissue, and the lining membrane of the canal which the tumor carried before it. Owing to peculiarity of structure a polypus may have so short a pedicle as to remain in close contact with the surface from which it has been expelled. Under other circumstances the pedicle will be drawn out to a great length, so that the polyp may remain within the uterine canal, or be expelled by the uterus into the vagina without breaking its connection. I have seen an instance of a fibrous polypus, as large as a walnut, hanging out of the labia, and connected with the uterine wall by an attenuated pedicle. But, as a rule, the little artery by which it is nourished becomes at length so stretched that the supply of blood ceases, and the tumor then begins to slough in the vagina. This is a very frequent course of the efforts at a spontaneous cure, and the mass may come away as a whole or gradually disintegrate. * * *"—EMMET.

See page 514, ECRASEUR.

GYNÆCOLOGICAL.

UTERINE. TUMORS AND POLYPI.

Curettes for Removing Intra-Uterine Vegetations and Fibrous Growths of the Uterus.

FIG. 3634.—Emmet's Enucleator.



FIG. 3635.—Emmet's Curette Forceps.



FIG. 3636.—Thomas' Curette.



FIG. 3637.—Skene's Curette.



FIG. 3638.—Yarrow's Enucleator.

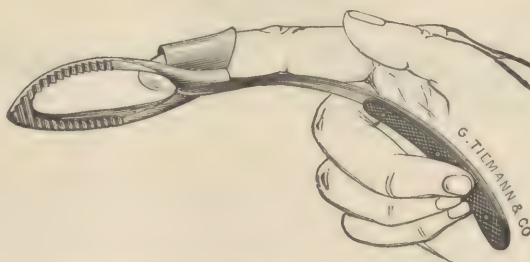


FIG. 3639.—Richardson's Finger Elongator.

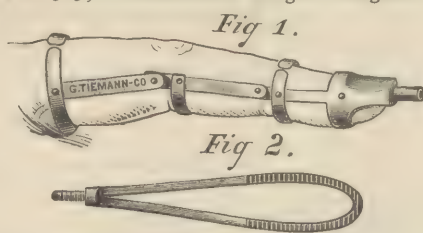


FIG. 3642.—Three Curettes.



FIG. 3640.—Simon's Curette.



FIG. 3641.—Simon's Curette.



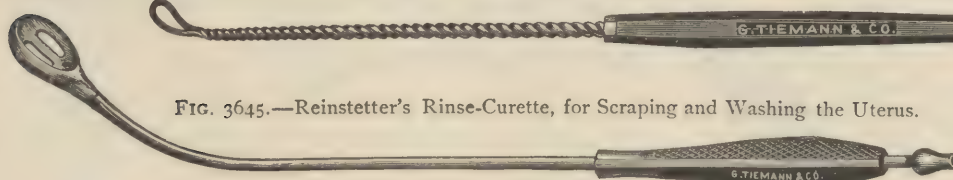
FIG. 3643.—Thomas' Serrated Scoop, for the Detachment of Sessile Uterine Fibroids.



FIG. 3644.—Bozeman's Curette.



FIG. 3645.—Reinstetter's Rinse-Curette, for Scraping and Washing the Uterus.



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Forceps, Ligators, Ecraseurs, Enucleators, for Removing Intra-Uterine Vegetations.

FIG. 3652.—Sims' Enucleator.



FIG. 3654.—Nelaton's Tumor Forceps.



FIG. 3646.—Sims' Vulsellum Hook.

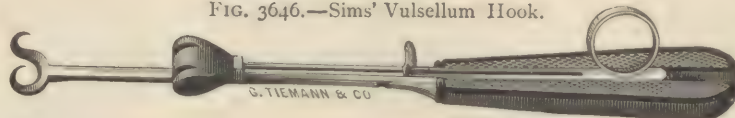


FIG. 3647.—Nelaton's Pedicle Forceps.

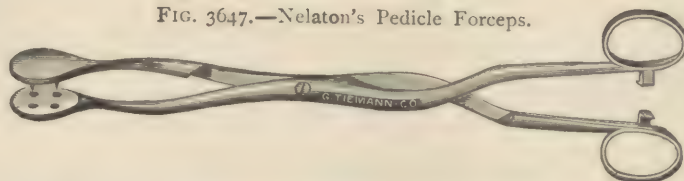


FIG. 3648.—Up de Graff's Tumor Forceps.

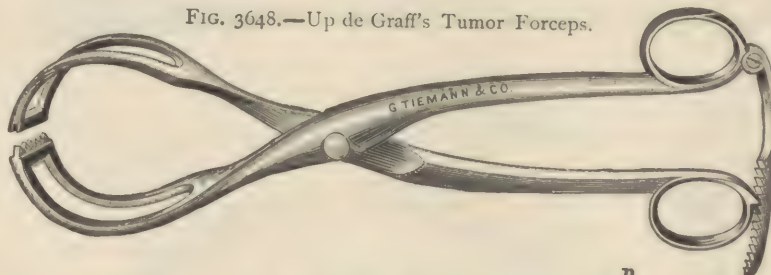


FIG. 3649.—Van Buren's Ligator.

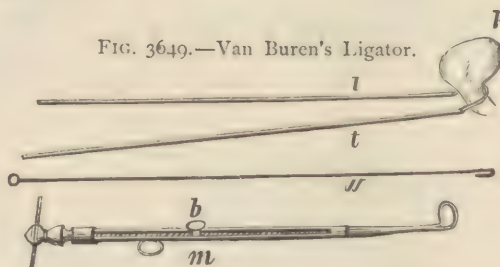


FIG. 3653.—Sims' Enucleator Blunt Hook.

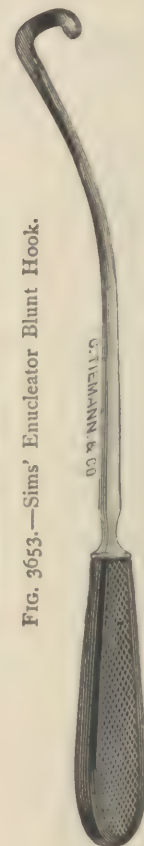


FIG. 3650.—Aveling's Polypome.

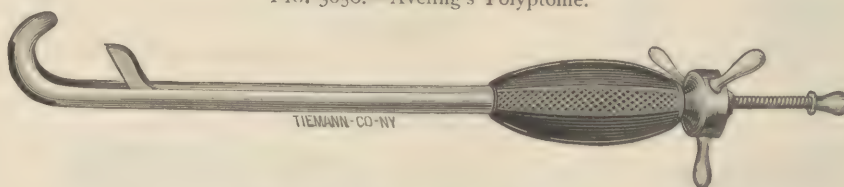
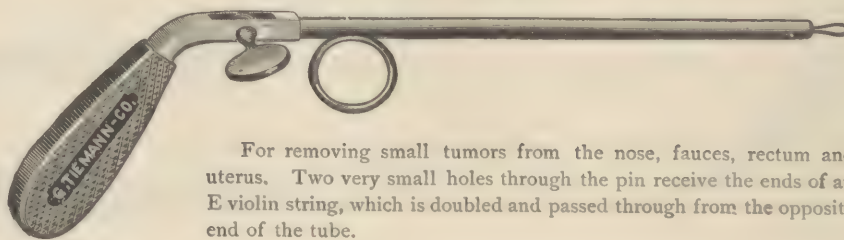


FIG. 3651.—Penn's Catgut Ecraseur.



For removing small tumors from the nose, fauces, rectum and uterus. Two very small holes through the pin receive the ends of an E violin string, which is doubled and passed through from the opposite end of the tube.

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Forceps, Ligators, Ecraseurs for Removing Intra-Uterine Vegetations.

FIG. 3655.—Byrne's Vulsellum Forceps.

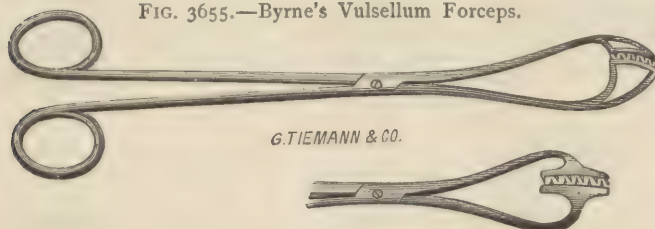


FIG. 3656.—Byrne's Vulsellum Forceps.

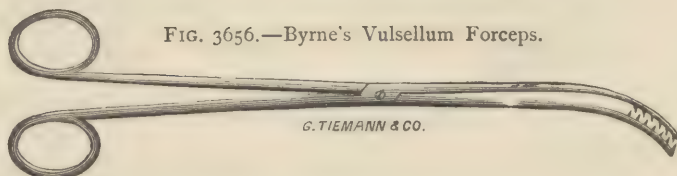


FIG. 3657.—Luer's Polypus Forceps.

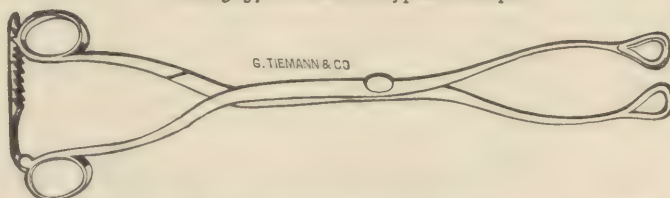


FIG. 3658.—Wales' Polypus Forceps.

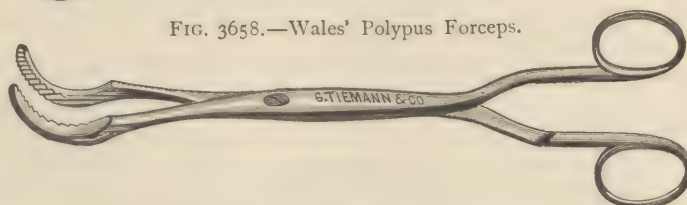


FIG. 3659.—Greenhalgh's Tumor Forceps.

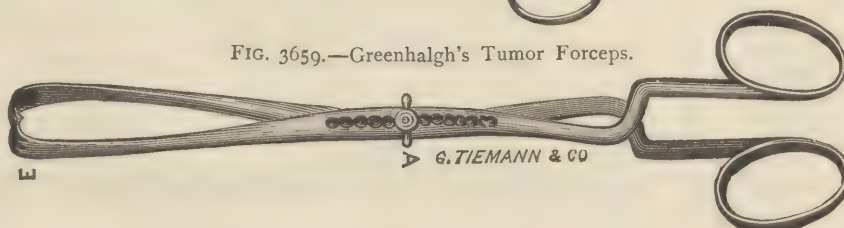


FIG. 3660.—McClintock's Polypus Forceps.

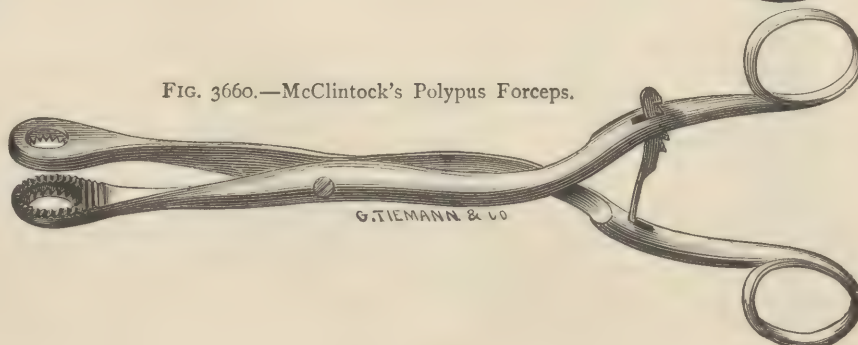


FIG. 3662.—Cushing's Vulsellum Forceps.

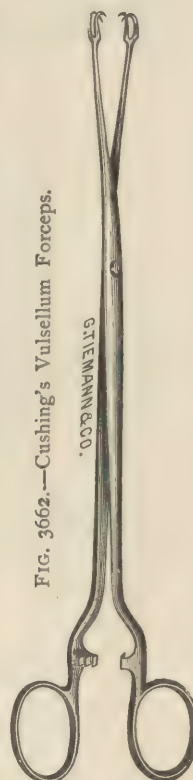


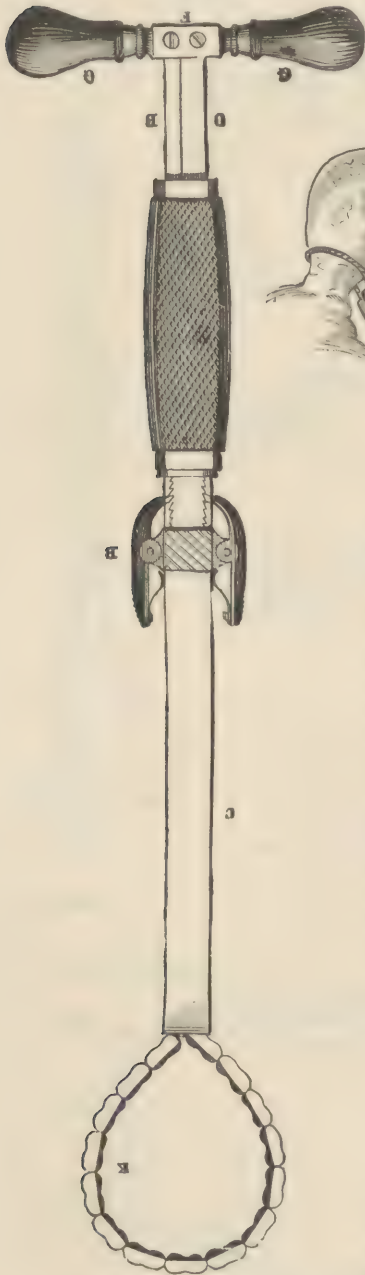
FIG. 3661.—Campbell's Tumor Forceps.



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UTERINE. TUMORS AND POLYPI.

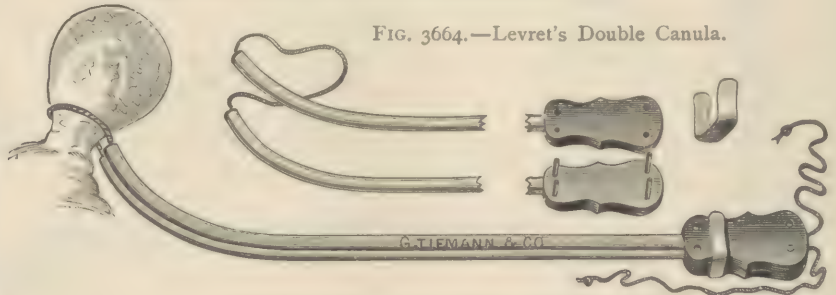
FIG. 3663.—Chassaignac's Ecraseur.



Ligators and Ecraseurs.

"*Removing Fibrous Growths of the Uterus.*—Formerly the general practice was to pass a ligature around the base of a polypus, and day after day it was tightened, generally by twisting, until, at length, the cord would cut through the mass as it sloughed. Depuytren was the first to remove uterine growths by dividing the pedicle with scissors; but, through fear of hæmorrhage, this method has never become general.

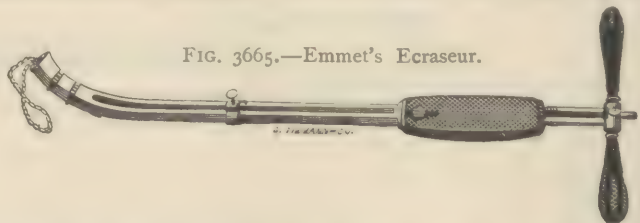
FIG. 3664.—Levret's Double Canula.



"The removal by ligature or torsion continued to be the practice until Chassaignac devised the *écraseur* for the removal of hæmorrhoids, when this instrument was adopted into this branch of surgery. It encircles the mass by a chain loop which crushes its way through as it is reduced in size, and by lacerating instead of cutting the tissues lessens the liability to hæmorrhage. Afterwards other instruments were constructed on the same general principle, with a wire substituted for the chain, on account of the difficulty of applying the chain, and the greater ease with which a loop of wire can be applied around the tumor within the uterus. Sometimes, it is true, the wire loop can be managed with more facility, but altogether it possesses no advantage over a well-made chain; and I have found that it is more liable to break when subjected to the same degree of strain.

"To better adapt the *écraseur* to this branch of surgery it is sometimes given a curve to conform somewhat to the relation of the uterus with the vaginal axis. But frequently the tumor within the uterus is so situated that, when the chain is tightened, it acts almost at a right angle to the instrument, with the effect of rendering the strain greater as the loop is shortened, and the instrument has thus often been broken. To obviate this and other difficulties, I had an instrument constructed, in 1866, on a plan of my own (see Fig. 3665),

FIG. 3665.—Emmet's Ecraseur.



of which an important feature was the placing of two or three joints at the end of the instrument, so that it might remain straight or bend upon itself at a sharp angle. The instrument in general use, under some circumstances, where it cannot adjust itself, cuts off a mass obliquely, which can never happen on using one with these joints. Instead of the chain being joined to the

ratchet portion, as in the original instrument, this is separated into two parts, and between them two flat rods, to which the ends of the chain are attached, slide through the handle, where they are secured by a spring catch. The object in having the ends of the chain attached to rods which can be separated is to facilitate the passage of the chain around a tumor when the latter is beyond the reach of the finger." (For further particulars see Emmet's "Principles and Practice of Gynæcology." 1884.)

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UTERINE. TUMORS AND POLYPI.

Ligators and Ecraseurs.

FIG. 3666.—Cintrat's Ligator.

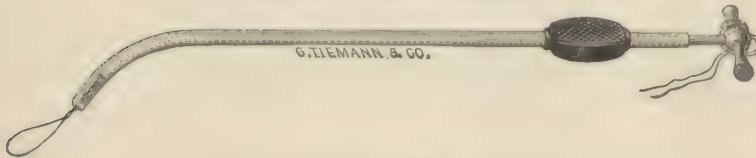


FIG. 3667.—Barnes' Wire Ecraseur.



FIG. 3668.—Smith's Wire Ecraseur (straight).

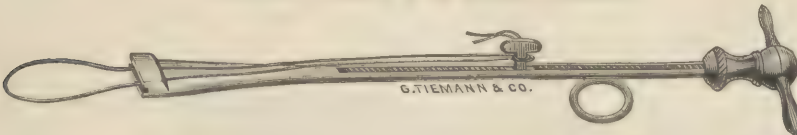


FIG. 3669.—Smith's Wire Ecraseur (curved).

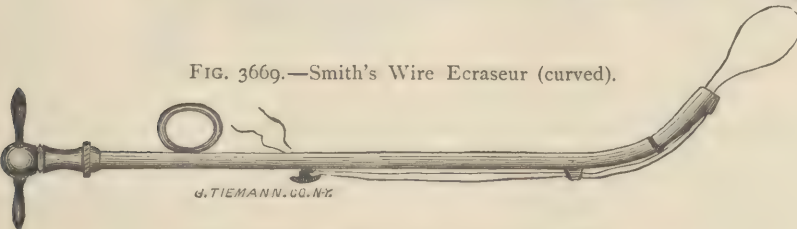


FIG. 3670.—Braxton Hick's Wire Ecraseur.

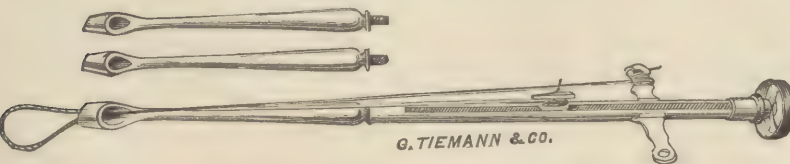


FIG. 3671.—Braxton Hick's Ecraseur (modified).



FIG. 3672.—Thompson's Ecraseur.

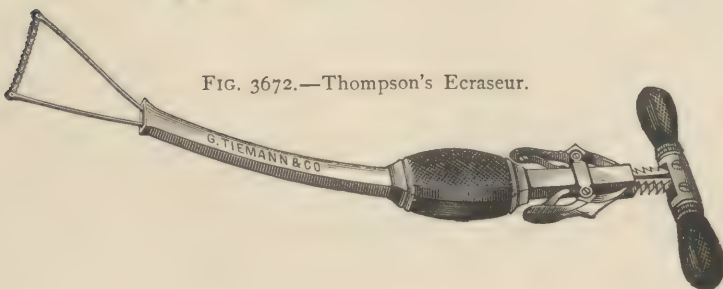
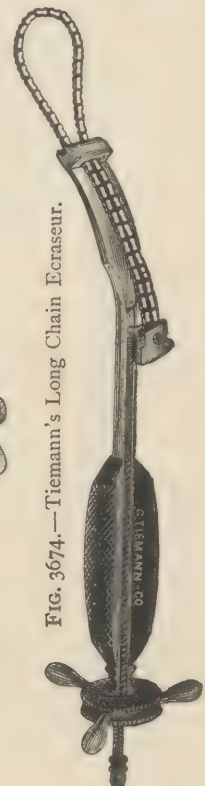


FIG. 3673.—Edward's Ecraseur.



FIG. 3674.—Tiemann's Long Chain Ecraseur.



GYNÆCOLOGICAL.

UTERINE. TUMORS AND POLYPI.

Ligators and Ecraseurs.

FIG. 3675.—Sajou's Wire Ecraseur.



FIG. 3676.—Emmet's Uterine Tourniquet.

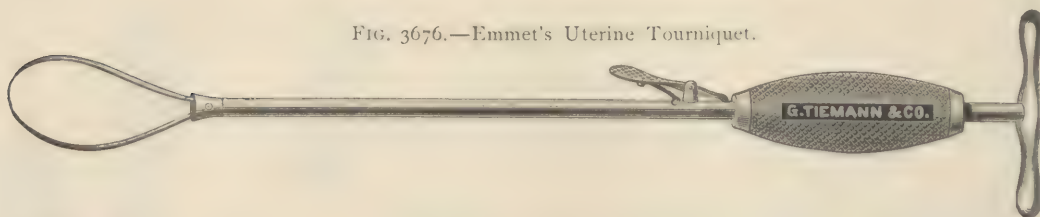


FIG. 3677.—Sims' Porte Chain Ecraseur.



MALIGNANT DISEASE. HYSTERECTOMY.

Partial or Complete Removal of the Uterus per Vaginum.

"Whenever the cervix becomes the seat of a malignant growth, the common sense indications are, either to eradicate the disease, or to check the excessive serous and bloody discharges, to correct the fetor, to allay the pain, and to prolong life. Now, the crumbling vegetations and the surface growths cause these serous, bloody and fetid discharges. The pain comes from progressive infiltration. It stands, then, to reason that whatever restrains these must prolong life; and, of course, if the disease can be eradicated, life may be saved for good. Hence the plan which meet these indications is assuredly to take away the whole, or as much as possible, of the diseased structures."—"Lessons in Gynæcology." Goodell.

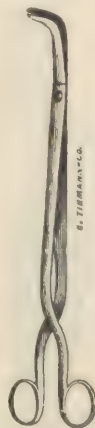
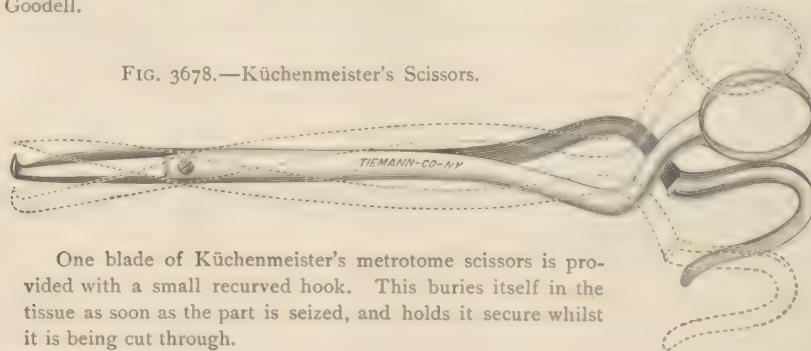
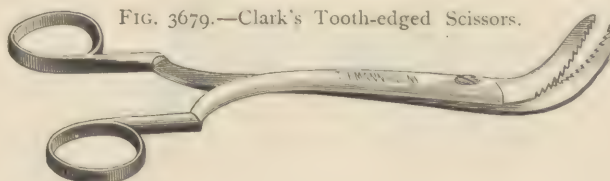
FIG. 3680.
Scissors for the Amputation of the Cervix.

FIG. 3678.—Küchenmeister's Scissors.



One blade of Küchenmeister's metrotome scissors is provided with a small recurved hook. This buries itself in the tissue as soon as the part is seized, and holds it secure whilst it is being cut through.

FIG. 3679.—Clark's Tooth-edged Scissors.



GYNÆCOLOGICAL.

UTERINE. MALIGNANT DISEASE, HYSTERECTOMY.

Partial or Complete Removal of the Uterus per Vaginam. (Continued.)

"Varieties of the Operation.—In some cases, as in cancer, for example, it is necessary to remove the entire cervix and even as much tissue as possible from that portion of the organ above the vaginal attachment. In others, only half of the vaginal portion requires ablation, while, in still another set of cases, only the removal of a thin section of the hypertrophied lips is called for.

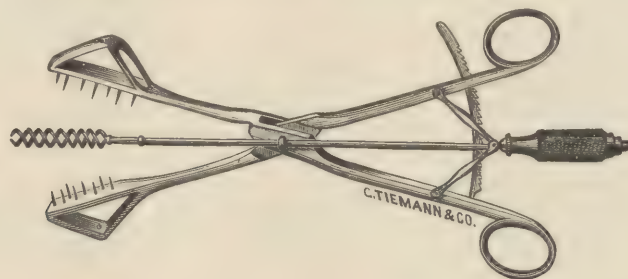
"Methods of Performance.—The operation may be performed by the following methods: 1. By the bistoury or scissors; 2. By the *écraseur*; 3. By the galvano-caustic battery.

"Operation by Bistoury or Scissors.—When performed by the first method, the patient should be placed upon the left side and Sims' speculum employed. The cervix being slit bilaterally, one lip is seized and cut off as near the vaginal junction as is deemed advisable, and then the other is removed in a similar manner. Formerly the operation was completed at this point, but Dr. Sims has introduced the practice of drawing down the mucous membrane and stitching it, with silver sutures, so as to cover the stump, as that of the arm or thigh is covered by skin after amputation of those parts. When the stump is covered by mucous membrane, after this plan, recovery is much more rapid than when granulation is allowed to accomplish the cure. This operation is often a bloody one.

"Operation by the Ecraseur.—In operating by this method, if the uterus be prolapsed, if the degree of longitudinal hypertrophy be so excessive as to cause full protrusion of the cervix, or if such protrusion be attainable by moderate traction, the patient may be placed on the back. If the uterus be high up in the pelvis and strong traction be necessary to depress it, the best position will be found to be that advised when scissors or the bistoury are employed, the speculum being used. The passage of the chain will be found to be very simple, and the part should be slowly cut through. In using the *écraseur* for this purpose, great care should be observed not to allow too great dragging of the chain upon the neck without cutting. If attention be not given to this point, the peritoneum may be opened or the bladder involved. I describe the operation by the *écraseur*, although I regard it inferior in merit to both the other methods. I do this because the operation is often called for far from surgical centres, where it is very difficult to procure a battery, and where no operator of sufficient skill can be found to perform the amputation by cutting instruments.

"Operation by Galvano-Cautery.—The galvano-caustic apparatus consists simply of an instrument which enables the operator to engage any part in a loop of wire which, being connected with a powerful galvanic battery, becomes red hot and cuts its way through.* In amputating the neck in this way, the patient may be placed upon the back and the uterus drawn down between the labia; or, if this depression of it be difficult, she may be placed upon the side and Sims' speculum employed. By one of these procedures the part to be amputated is fairly exposed to view and manipulation. The wire loop of the galvano-cautery is passed around the neck as high up as is deemed safe, and tightened until it is fixed in the tissues so as not to slip. Then the current of electricity is made to pass through it, and the loop being slowly tightened, by the turning of the screw by the operator, the cervix is amputated. To accomplished the operation completely, I have devised the forceps shown in Fig. 3681. By the long sliding screw

FIG. 3681.—Thomas' Forceps for Amputating the Cervix.



between the blades, the cervix is drawn into their grasp and fixed by closing them. Then the screw is withdrawn and the cold wire slid over the projecting portions and tightened, and, the electric current passing, a red, and not a white, heat being established, the cervix is completely removed. By this method immediate hæmorrhage is usually controlled, but not so remote hæmorrhage. Sometimes on the fifth, sixth, or even the tenth day, a most active flow takes place in spite of every precaution. For this reason the tampon† should be used after such an amputation, and the patient's convalescence be carefully watched."—"Practical Treatise on the Diseases of Women." T. Gaillard Thomas, M. D. 1880.

* See "Dawson's Galvano-Cautery Battery," page 37.

† See page 478.

GYNÆCOLOGICAL.

UTERINE. MALIGNANT DISEASE, HYSTERECTOMY.

Partial or Complete Removal of the Uterus per Vaginam. (Continued.)

"Schroeder's Method of Supra-Vaginal Excision of the Cervix.—Having passed stout ligatures laterally through the parametria, the uterus is drawn down, if practicable, so that the os externum presents at the vulva. An incision extending into the connective tissue is now made in front of the whole width of the anterior lip, about two centimetres distant from the diseased tissue. It is then easy to separate the bladder from the cervix without endangering the ureters, provided firm traction on the cervix is kept up. It is quite exceptional to find the tissue so firm as to require the use of the scissors. Having freed the cervix in front, he drags the posterior lip forward, so as to bring the posterior vaginal vault within reach, and cuts through it in the same way, the two incisions meeting laterally. It does no harm to cut into Douglas' pouch, and, when amputation is done very high, it is better to cut into it purposely and remove that part of the serous membrane that belongs to the piece of cervix removed. The liberation of the cervix is most difficult at the sides, for there the cellular tissue is firmer and larger branches of the uterine artery enter the cervix. Here, therefore, the scissors must often be called into play, and spurting arteries be controlled with forceps and tied; but, as a rule, the bleeding is moderate. When the cervix has been liberated all around, it is cut through at the desired point, from before backward, until the canal is opened. Then, before the section is completed, the anterior wall of the vagina is united to the anterior part of the stump of the cervix with deep sutures. Traction on these sutures gives us command of the stump, even after the posterior wall of the cervix has been divided. The posterior cut surface of the uterine wall is then readily stitched to the posterior wall of the vagina. One, if practicable two, of the lateral sutures should be passed deep into the uterine tissue, to control hæmorrhage; there is no danger of including the ureters so long as the traction on the uterus is kept up. At the extreme sides, the cut edges of the vaginal wall are to be stitched to each other and held fast against the sides of the uterus with deep sutures."

"Dr. W. H. Baker, of Boston, reports the result of his practice by even a more extensive incision.* His mode of procedure is essentially Schroeder's method, with the exception that he avoids opening the peritoneal cavity behind, when it can be avoided. The chief difference between the two procedures is that Schroeder cuts the cervix square off at the line of excision, while Baker begins on a line with the internal os and removes a cone-shaped section with the apex extending up the canal as near the fundus as possible.

"Schroeder's Method of Vaginal Excision of the Entire Uterus.—Having dragged the organ forcibly downward with two pairs of Museux's forceps, one grasping each lip, he incises the anterior wall of the vagina, by the method already given, and separates the bladder from the cervix thoroughly. This done, the posterior vaginal vault is cut through, so that the cervix is freed on all sides, and then Douglas' space is opened. Cutting with scissors, he extends the opening to the utero-rectal ligaments and introduces two fingers of the left hand into the abdominal cavity, over the uterus and into the utero-vesical pouch. Cutting on these two fingers, he divides the peritonæum. By combined manipulation the uterus is now retroverted, and the attempt is made to bring the fundus through the wound in the posterior vaginal vault. This is not a very easy matter, and the difficulty increases with the size of the uterus. It is best accomplished by traction with the forceps made to grasp the organ as near as possible to the fundus. When the body of the uterus, covered with peritonæum, has been brought out at the vulva, the ligation of the broad ligament must be so managed as to allow of the uterus being cut away without the ligatures slipping. This is quite difficult when we undertake the entire removal of the tubes and the ovaries, for then the ligatures have to be applied to the tense infundibulo-pelvic ligament, from which they are apt to slip when the ligament retracts after the section is made—giving rise to abundant hæmorrhage that is hard to control, on account of the locality. It is much easier when the uterus alone is to be removed. He usually ties *en masse* on each side, and then applies two additional ligatures close to the first one, one for the upper and one for the lower part of the broad ligament. * * * A drainage tube is placed in the centre of the wound and the lateral portions are brought together without making any attempt to secure nice coaptation of the peritonæum. The vagina is then packed lightly with salicylized wadding, and the free end of the drainage tube is filled with the same material. Injections are to be made through this tube if there should be a rise of temperature or an offensive discharge escaping. The tube and sutures are left in place for two or three weeks."—"Principles and Practice of Gynæcology." Emmet. 1884.

Abdominal Section.

"No department of surgery has made the same advances within the last thirty years as that of pelvic surgery by abdominal section. Ovariectomy, oöphorectomy or Battey's operation, the removal of the uterine appendages or Tait's operation, oöpho-hysterectomy or Porro's operation, gastro-elytrotomy or Thomas' operation, extirpation of the uterus or Freund's operation, and hysterectomy or Kimball's operation, by which is meant the removal of the whole body or any section of the uterus, with tumors inseparable therefrom. These form a list of surgical achievements, within a short period, which every gynæcologist is proud to look at to-day."—H. P. C. WILSON, M. D. 1883.

* "The Treatment of Cancer of the Uterus." *American Journal of Obstetrics*, April, 1882.

GYNÆCOLOGICAL.

HYSTERECTOMY.

Per Abdominal Section.

"Removal of the whole body, or any section of the uterus, with tumors inseparable therefrom."—KIMBALL.

"The extra peritoneal method has met with great success in the hands of Péan, of Paris, who has the merit of having elaborated it as a distinct method. He operates as follows: The tumor having, if necessary, been reduced by '*morcellement*,' it is drawn out of the abdomen and held perpendicularly by an assistant. The operator, having ascertained with a sound the relations of the bladder (which only in rare cases requires to be dissected off), transfixes the cervix with two strong wires at right angles to each other. Below these wires the curved needle (represented at Fig. 3682) is carried through the cervix and drags back a double wire. This wire is divided, and each half is fitted into a *serre-nœud* of Cintrat (Fig. 3683), by means of which it is both tightened and twisted. The tumor and uterus are amputated above the wires. The pedicle is placed in the abdominal wound, and is kept from retracting into the abdomen by means of the wires and *serre-nœuds*; these are left in position so that they may be tightened in case of hæmorrhage."

FIG. 3682.—Curved Needle.



FIG. 3683.—Cintrat's Serre-Nœud.



"Cintrat's *serre-nœud* (Hegar).—The wire, after having been placed around the neck of the uterus or tumor, is fixed on the knob which travels on the thread of the screw. On turning the handle when the middle piece is held firm at the larger loops, we tighten the noose; when the head piece is held at the smaller loops, we twist the wire."—Leblond, "Manual of Gynæcology," Vol. II. Hart and Barbour.

FIG. 3684.
Kœberlé's Serre Nœud, Forceps and Skewer, with Cap.

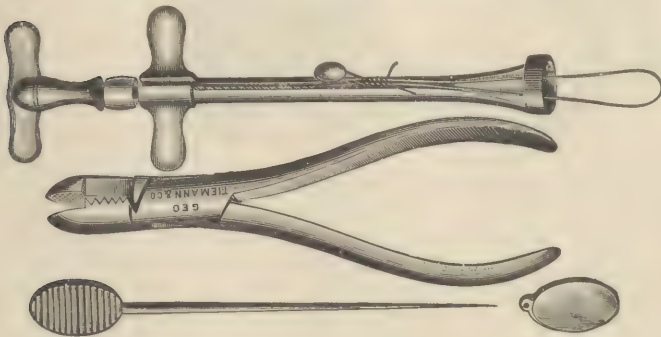
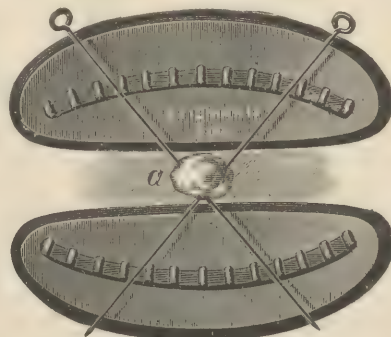


FIG. 3685.
H. Marion Sims' Abdominal Protectors.



"The two rubber plates shown in the cut are for use in the operation of Hysterectomy, where the stump of the uterus is drawn outside of the abdominal incision and transfixed by 'skewers.' The tension is sometimes so great, especially in stout persons, that the skewers will cut into the flesh and cause deep furrows, which are extremely painful to the patient. To obviate this result the 'protectors' were devised by Dr. H. Marion Sims. The plates are made of one piece of hard rubber, are about five inches long, two and one-half wide and one-eighth inch thick. Running along the centre in a curved line are locks, for the purpose of firmly holding the four ends of the 'skewers.' These plates are an admirable protection to the abdominal walls, besides making the skewers hold the stump more firmly than they would do without their aid."

FIG. 3686.—Wilcox's Hysterectomy Pin.



GYNÆCOLOGICAL.

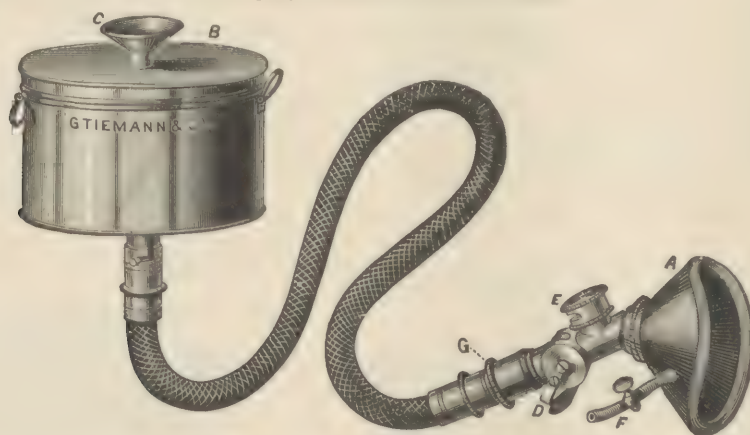
ABDOMINAL SECTION.

Laparotomy.

"Remarkable advances have lately been made in the surgery of the abdominal cavity. Early in the year Mr. Lawson Tait reported a series of a thousand cases in which the abdominal cavity had been opened for the relief of a variety of conditions, with a mortality of but 9.3 per cent. In connection with this branch of surgery, the diseases of the uterine appendages known as hydro-salpinx and pyo-salpinx (which are essentially an enlargement of the Fallopian tubes, the cavity containing fluid, and complicated in many cases with inflammation or its results in the neighboring organs) have attracted much notice. Mr. Tait was among the first to direct attention to the frequent existence of this condition and to the comparative safety of operations for the removal of diseased organs when performed with proper precautions. The number of such cases operated on by Mr. Tait and many other surgeons has already become very considerable, and the relief that has been afforded to women whose lives had previously been rendered miserable is so great as to warrant the assertion that there has been hardly an operative procedure introduced for many years which produced such notable results.

"Within the year several successful operations have been reported, in which the abdominal cavity has been opened, and wounds in the intestines have been closed—a class of cases that have heretofore been regarded as essentially fatal. The gall-bladder has been opened for the removal of gall stones, with successful results. Kidneys have been removed on account of disease. Cases of chronic and acute peritonitis have been treated by opening the abdomen to secure drainage and removal of the causes and products of the disease."—"Appleton's Annual Cyclopædia." 1885.

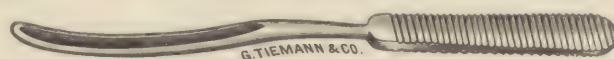
FIG. 3687.—Thallon's Ether Inhaler.



"To avoid the various dangers and complications, and to accomplish the even giving of ether, this apparatus was devised by Dr. Skene and myself. The apparatus consists essentially of a large tin receiver, a connecting tube fifty-three inches long, and a mouth-piece. The receiver is filled with alternate layers of loose sponges and wire gauze, thereby affording a large vaporizing surface for the ether. The ether is poured into a funnel-shaped opening in the top, and, to prevent any overflow of ether running out at the bottom, the tin flange to which the connecting tube is attached projects about three-quarters of an inch into the receiver. The tube is locked to this receiver by a bayonet catch. The connecting tube is flexible and precisely similar to those used by dentists in the administration of nitrous-oxide gas. At the mouth-piece end of the tube are the same two valves; one allowing the inspiratory current to pass from receiver to mouth, but preventing the expiratory one passing back into the tube; the second allowing the expiratory current to pass into the surrounding air, but preventing an ingress of air through that opening. And, lastly, between these two valves is an opening, beneath which is a movable perforated diaphragm, by which any desired percentage of fresh air can be added to the inspiratory current, so that you can pass from pure air through all intermediate gradations up to pure ether-vapor, while the rate of that flow can be hastened or retarded by raising or lowering the receiver. The mouth-piece is slightly modified from Clover's model; it is locked to the connecting tube by a bayonet catch."—Wm. M. Thallon, M. D. *New York Medical Journal*, January 2, 1886.

See, also, page 43.

FIG. 3688.—Sims' Ovariectomy Director.

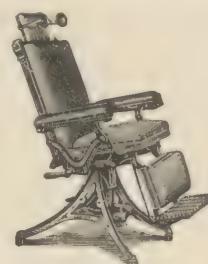
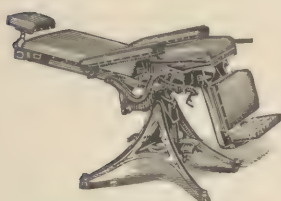
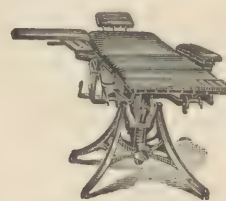
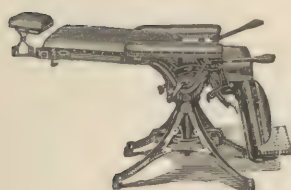
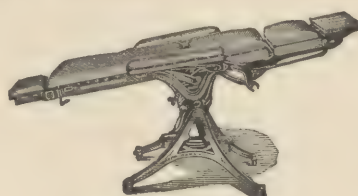


GYNÆCOLOGICAL.

The Harvard Physicians' and Surgeons' Chair.

The Harvard is capable of every position desirable in the practice of the surgeon, gynæcologist, the oculist or aurist.

FIG. 3689.

*A.* Normal adjustment.*C.* Full length reclining position.*B.* For operation upon the eye, ear or throat.*G.* For elevating the hips.*H.* Three-quarter length reclining.*I.* For operations on the hand or arm.*F.* Dorsal position.*D.* Reclining with head lowered.*E.* Sims position.

It is the only surgical chair capable of being rotated. It is the only chair capable of the lateral motion, Sims position, as seen in Fig. *E* (in this the head may be lowered more than seen in the cut and the step dropped out of the way, as in figure *H*, if desired); the only one capable of the backward inclinations, Figs. *B* and *D*, or of the hip elevation, Fig. *G*, or of the arm support, Fig. *I*, features recognized by the profession as most important.

It perfectly balances with or without a patient upon it, and consequently all its various positions are quickly attained with ease to the patient and operator. The heaviest patient can be placed in any position with the slightest effort. Set upon a large steel screw, it may be raised or lowered or rotated, to get the direct light. When put in the lowest reclining position the chair forms an operating table 29½ inches high, and may be so adjusted by means of the screw that the elevation shall be anywhere from 29½ inches, the lowest, to 34½ inches, the highest. By means of a set screw it may be rigidly bound to the base when desired, to prevent its turning. The head rest is universal in its movements; may be raised, lowered, extended backwards or forwards, moved to right or left, and rigidly set to any position by means of a single set screw. The head rest folds up when thrown back, leaving no projecting iron to be in the way. The side arms drop down and back with the patient and form a support for his arms while reclining as well as while sitting. Either side arm may be turned out of the way in the use of the speculum. The step is at all times horizontal, and, with the rest of the chair, forms a level plain, presenting nothing against which a patient can brace himself or struggle while under the influence of anæsthetics. The chair may be fastened at any of the points designated in the cuts, their opposites or any intermediate points. It is practically noiseless in its operations. The working parts are under the seat, rendering it impossible to catch or tear the garment of the patient or pinch the hands of the patient or operator. The system of bracing renders the chair so rigid that it can never, by long or hard usage, sag or get out of shape. The base and working parts being made of iron, it is not like wood, liable to get rickety or out of order. The stirrups are self-fastening, have no thumb screws, and cannot drop with the foot of the patient in them. Any position may be directly attained without a complication of movements. It is always ready for any position; no extra parts to be brought in and hitched on. It has no cogs or cog wheels, no cranks or levers, and no ratchets to rasp the nerves of the patient. The Harvard is the most ornamental as well as convenient surgical chair ever offered to the profession.

GYNÆCOLOGICAL.

ABDOMINAL SECTION.

Ovariotomy.

"*Oöphorectomy, Oāriotomy, Oāriotomia, Ovariotomy, Excisio Ovarii, Oāriosteresis.*—The operation for removing the ovary was first performed, in 1809, by Dr. Ephraim McDowell, of Kentucky. As now practiced, it includes incision into the peritoneal cavity, exploration for adhesions, evacuation of the cyst, detachment of the adhesions, extraction of the cyst, and the treatment of the pedicle, the latter including the employment of the ligature, torsion, acupuncture, *écraseur*, clamp, &c."—DUNGLISON.

"We are indebted to many in this country and abroad for important contributions to our knowledge of ovariotomy; but chiefly to Sir Spencer Wells must we acknowledge our obligation for his great service in popularizing the operation and making its details so familiar to us. The world is largely indebted to him for his valuable teaching, and his name will always be honored wherever ovariotomy is known. To the remarkable success attained by Dr. Charles Clay, of Manchester, England, after 1842, we must attribute the acceptance of the operation by the profession, not only in England, but in this country. To him is certainly due the impulse given to the development of the operation in this country by the Atlee brothers, an impulse so favorable that, according to Dr. Peaslee, eighteen American surgeons had performed the operation previous to the year 1850. A more accurate knowledge of the operation was obtained by the publication, in 1855, of Dr. Atlee's first thirty cases, and in the following year a prize essay on ovariotomy was written by Dr. G. H. Lyman, of Boston, which was the most thorough and exhaustive treatise on the subject which had appeared up to that date. After 1860 the number of operators increased rapidly."—"Principles and Practice of Gynæcology." Emmet.

The Operating Room and Instruments.

Tait's Method.—"The room in which the operation is to be performed should be fairly large, and so arranged that ventilation may be possible from window or door to the fireplace without the current crossing the bed of the patient. There should be no unnecessary furniture, and as little upholstery as possible. Two small iron couches, with firm hair mattresses and a water-pillow, are needed; and an intelligent woman for nurse, who will do as she is told, *and nothing more*, is absolutely essential. If two such can be got, to act as relays for the first eighty hours after the operation, it will be found a great advantage. The patient herself requires a little preparation for the change that is about to be made in her alvine actions. For this purpose I direct that her food should be limited to soup and a very little bread for forty-eight hours before the operation, and that on the morning of the day previous she shall have a small dose of castor-oil. I prefer that the room should have a northern light, that the day should be clear, and I have the patient placed on a firm narrow table, with her feet directed against the window. The arms and legs are secured by bands to the table, so that only one assistant is required, one person to give the anæsthetic and one nurse to look after the sponges. All other bystanders are earnestly requested to do nothing unless specially desired, and above all not to speak during the operation. My assistant is duly instructed in his work, and I never, if I possibly can help it, operate with any but my usual assistant, for it is quite as important that he should know how to help me as it is that I should know how to operate. All the preparations of the instruments and sponges I make myself, and then I am sure nothing is forgotten; or, if anything should be omitted, I have only myself to blame. As a successful ovariotomy is the resultant of a large number of petty details carefully attended to, no amount of care and precision can be too great in carrying them out.

Tait's Set.—"The instruments to be provided are: a perfect sharp scalpel, twelve of Kœberlé's artery forceps (see Fig. 3148), four handled needles threaded with two thicknesses of silk, two pairs of cyst forceps, a pair of large screw bull-dog forceps, a wire clamp, a pair of scissors, a number of pieces of fine silk, about a foot long, for ligatures; a number of pieces of somewhat thicker, eighteen inches long, for sutures; Paquelin's thermo-cautery, an aspirator, two sizes of trocars, and twelve good sponges.

Quality of the Instruments.—"Of this list some of the items require special mention, and the first is the artery forceps of Kœberlé.* Of the numerous minor improvements in our methods of operating, none deserves to be spoken more highly of than the introduction of this instrument. I give an illustration of the pattern I use (see Fig. 1485), though I do not know that it has much advantage over M. Kœberlé's original form beyond the fact that it is stronger and does not break, and that its pointed nose cannot be tied in the ligature. Its method of action will at once be seen. As soon as a bleeding point is seen it is seized by one of these instruments and left in its clutches, so that, when the operation has advanced as far as the treatment of the pedicle, as many as eight or ten of these forceps may be hanging about the wound. More than twelve are rarely required, and if there should be need of more, one or two in use must be released by the assistant throwing a ligature around the points held by two or three. I have never more nor less than twelve, and I have them always ready to my hand, in a small tray covered with water and ranged carefully in order side by side, so that at a glance I can tell how many are in use. In this way I make sure that I never leave one inside." * * *

* See ARTERY CLAMP FORCEPS, page 94.

GYNÆCOLOGICAL.

OVARIOTOMY.

The Instruments. (Continued.)

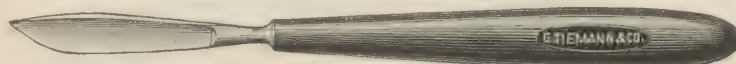
"These instruments are of great service in saving time, and this is a matter of importance in an operation which may extend over an hour. When the time comes for the removal of the forceps, after the pedicle has been dealt with, it will generally be found that the mere pressure has stopped most of the bleeding points. These instruments will also be found of great service in pulling out cysts and in many other ways which experience will indicate. The *handled needles*, armed with silk, are items of the list upon which I take a great deal of trouble. They must be well made and well tempered, so that they will neither break nor bend. They must not have cutting points and must not make big holes. The eyes must be perfectly smooth and round, so as not to cut the silk. In fact, like everything else in ovariectomy, they must be perfection. The silk with which they are armed is of two thicknesses, for I always tie a pedicle or a mass of omentum with the thinnest silk I think capable of securing it. Therefore, for a thin pedicle I use thin silk, and for a thick pedicle I use somewhat thicker silk. The silk must be pure Chinese twist, with no cotton in it—an adulteration easily detached by liquor potassæ. I scald every piece of silk to be used before the operation in boiling water, to get rid of the gum, and then I stretch it tightly to test it and to reset the fibres. In this way I have secured myself against ever having had a ligature slip, an accident I have heard other surgeons complain of.

"The form of *trocár* I use for emptying the cyst is illustrated (see Fig. 1726, on page 128), and I claim for it the advantages that, being perfectly solid, it never admits air, and, having no inside mechanism, it never gets out of order. The form of its point enables the operator to puncture secondary cysts without any alteration of the mechanism; it is not sharp and therefore can do no harm. Of the *sponges* to be used it is almost impossible to speak with too great emphasis, as I distrust them more than anything else about the operation. I never let them out of my sight and I will not permit any one but the nurse in charge of them to touch them. They are prepared for each operation with the utmost care, and the number in use is constantly *twelve*. They are counted before the operation, before the wound is closed, and again afterwards, so that by no possibility should one be left inside—an accident which has happened a great many times in the history of ovariectomy and which nothing but the greatest care will prevent recurring.

"Let me further say again that no one should touch the sponges but the nurse responsible for them. In one of my early operations, many years ago, a bystander hearing me ask for a small sponge tore one in two, so that there were thirteen in use instead of twelve, and both the nurse and myself were ignorant of the fact. The gentleman who tore the sponge alone knew of the act, and he left the room before the operation was finished. The result was that we found that thirteenth sponge four days after, and the horror of the circumstance is as vividly in my mind now as if it happened yesterday. I shall never forget it as long as I live.

"The sponges used should be of the very best quality, should vary somewhat in size and shape, and should be perfectly free from tears or ragged points from which pieces may become detached. When they are new I soak them for twenty-four hours in a solution of muriatic acid sufficiently strong to be disagreeably sour to the taste. This dissolves the particles of chalk with which they are infested and loosens the sand, and this must be completely washed out of them. After each operation I wash them free from color and then soak them for forty-eight hours in a strong solution of washing-soda or ammonia, to dissolve the fibrin. They are washed repeatedly, until the water comes from them perfectly clear, and after that they are placed for a week in a five per cent. solution of phenol. Finally, they are hung up in a well-made calico bag in a warm place till they are quite dry. It is to Dr. Keith that we are indebted for the free and efficient sponging out of the abdomen now always practiced, and in this respect he has again largely contributed to the advanced success of abdominal surgery."—"Diseases of the Ovaries." Lawson Tait.

FIG. 3690.—Pilcher's Aseptic Scalpel.



The Ovariectomy Operation.

"For ovariectomy I generally have the patient anesthetized on the bed and then lifted upon the table, the object of this being that she is saved the distress of seeing the preparations which have been made for the operation, as the instruments and other appliances are not brought into the room until she is unconscious. When upon the table, the arms and legs are secured by belts, and two clean towels are arranged so as to leave the abdomen exposed between them. The bladder has previously been emptied by the nurse, and I have personally inspected all the arrangements of instruments, sponges, &c., to see that nothing has been omitted. I begin the incision midway between the umbilicus and the pubes, and cut downward, going completely through the skin and subcutaneous fat at one cut, for a distance of about two and a half inches. I then look for the white line and divide it to an equal extent, and after that I cautiously divide the fat and transversalis fascia until the peritoneum is exposed."

GYNÆCOLOGICAL.

OVARIOTOMY.

Incision into the Peritoneal Cavity and Exploration for Adhesions.

* * * "A pause is then made, and every bleeding point is secured by a pair of hæmostatic forceps. I never, in the first instance, make an incision any longer than two and a half inches, because I am very averse to making the wound any larger than it need be, and, as a rule, three inches is enough. As soon as all the bleeding points have been secured, I open the peritoneum so as to admit my forefinger, and with that I make a brief preliminary exploration. The peritoneum is then laid open to an extent corresponding with the wound in the other tissues and the cyst is exposed, any further bleeding being immediately arrested. In this stage of the operation, indeed through the entire proceeding, I never use any other director than my finger, for upon that I can place most reliance. If there should be no adhesions between the tumor and the peritoneum in front, this part of the operation is very simple; but if there be adhesions, it is often no easy matter to determine the point of union between the two membranes, and it is in such a state of matters that inexperienced operators are apt to commit a grievous error. I have twice known instances, and I have heard of several others, where the glistening peritoneum has been mistaken for the wall of the cyst, and the operators have industriously set to work to separate the former membrane from the transversalis fascia. Sometimes, even when there is no adhesion, the peritoneum is so greatly altered in appearance, having become so thick, leathery and gelatinous, as to deceive any but the most experienced operator."

Evacuation of the Cyst.

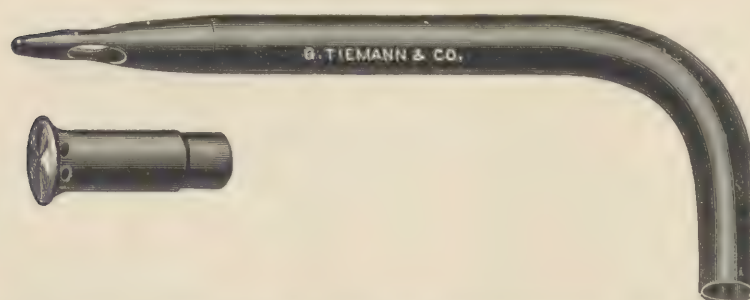
"When the point of union between the cyst and peritoneum cannot be discovered, the best way is to cut cautiously inward until the cyst be opened, because then it can be emptied, the whole wall carefully taken up and examined and the several parts accurately determined. This, however, wants great caution, for it may be that a piece of intestine lies in the way and may be opened by mistake; but the experiences of a few cases will enable an observant surgeon easily to determine when he is cutting through muscular fibre. When the cyst is reached, it should be tapped by a large-sized syphon trocar (page 128) and emptied as quickly as possible. Sometimes, however, the contents of an ovarian cystoma are glairy or even perfectly gelatinous and will not pass through a trocar, and nothing tries the presence of mind of an experienced operator more than this. The peculiar adhesive mass which sometimes fills an ovarian cyst will neither pass through a trocar, nor be seized by the hand nor lifted up by a sponge, and to remove it from the cyst is often a matter of the greatest difficulty. In such a case the walls of the cyst are generally thin and extremely fragile, so that they cannot be held by forceps. Such tumors are often very adherent, the adhesions bleeding very freely when broken down and many of these cases are lost on account of the mere extension of time required for the removal of the cyst contents. In a case like this there is nothing but to enlarge the incision to the extent of four or five inches, or even more, and to remove the mass by the hands as rapidly as possible, the assistant aiding in the process by squeezing upon the flanks. If, however, the cyst contents are fluid and the tumor consists mainly of one cyst, without adhesions, nothing would seem more simple than an ovariectomy, and the removal of a parovarian cyst is usually a proceeding which takes a shorter time to perform than to describe."

Trocars for Tapping.

SPENCER WELL'S,	FIG. 1720.	THOMAS',	FIG. 1721.
FITCH'S,	FIG. 1722.	EMMET'S,	FIG. 1723.
WARREN'S	FIG. 1724.	DUNSTER'S,	FIG. 1725.
TAIT'S,	FIG. 1726.	WELL'S,	FIG. 1727.

See, also, ASPIRATORS, page 129.

FIG. 369I.—Hanks' Modification of Tait's Trocar.



"When the cyst is emptied, it should be drawn gently out through the wound; and, if non-adherent, no obstacle will be met with unless it be the presence of some secondary cysts. The trocar having been maintained in its position by means of the spring catches at its sides (Fig. 1726), its points should be made to enter these cysts, and thus empty

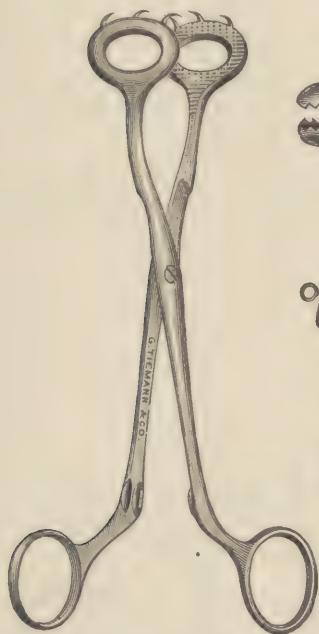
GYNÆCOLOGICAL.

OVARIOTOMY.

Evacuation of the Cyst. (Continued.)

them; but very often the contents of these secondary cysts are much thicker than the fluid contained in the major ones, and sometimes they are so numerous and of such small size that they constitute a solid mass at the base of the tumor. In such a case I lay open the major cyst, and, passing my hand within it, I break up into its cavity as much as I can of the secondary cyst mass, in order to save any further enlargement of the abdominal wound. During the whole of these proceedings as much care as possible should be taken to prevent any escape of the cyst contents into the abdominal cavity."

FIG. 3692.
Wilcox's Sac Forceps.



Sac Forceps.

FIG. 3693.—Thomas' Sac Forceps.

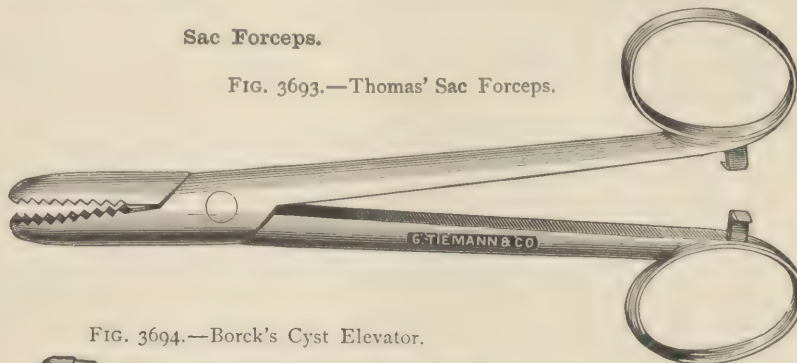


FIG. 3694.—Borch's Cyst Elevator.

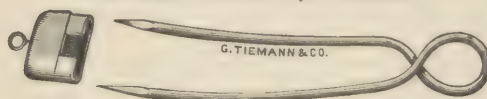
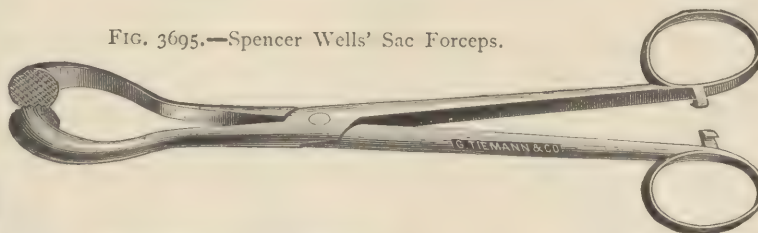


FIG. 3695.—Spencer Wells' Sac Forceps.



Detachment of Adhesions.

"Adhesions are mediate or intermediate, the former being generally parietal or omental, existing in the shape of round or flattened bands of peritoneum. They seem to be found by isolated patches of adhesion, which have dragged the peritoneum from the abdominal wall, or by pieces of adherent omentum. They are seldom large, and are only of any moment when traversed by an important bloodvessel, which must always be secured by torsion or ligature, or by the cautery. The immediate adhesions require great patience to overcome them; but, even when they unite the tumors to the most important organs, they may be separated, or a piece of the cyst may be detached and left. One of the dangers of the removal of an ovarian tumor with extensive pelvic adhesions—and still more of an uterine tumor—is damage to one or both ureters. It will be remembered that they run down obliquely from the kidney over the brim of the pelvis down to the bladder, lying over on each side of the cervix and close to it. I have often laid them bare, but have never been unfortunate enough to injure them. Many curious and exceptional forms of adhesion occur, one of the most remarkable of which is occasional adhesion of the tip of the vermiform appendix of the cæcum to the tumor. I have seen this three times, twice in my own practice. The first time I saw it, it was unfortunately divided by the scissors of the operating surgeon, with a fatal result; and it was only the discovery of this misfortune at the post-mortem which enabled me to recognize a similar condition and avoid a like disaster in my own cases. In dealing with pelvic adhesions it must be borne in mind that the large venous trunks in that region lie immediately under the peritoneum, and that they must be carefully avoided. * * *

"Hæmorrhage from adhesions has always a very strong tendency to arrest itself, and most of the bleeding points will stop of their own accord, or can be stopped by simple pressure with a sponge; each point of importance should be seized by a pair of hæmostatic forceps (Fig. 1485), or touched with a cautery or with a piece of solid perchloride of iron. For the arrest of a general oozing from a large surface, the pressure of two or three dried sponges is generally enough, and it is, therefore, my practice always to separate adhesions as rapidly as possible and to follow their separation by the immediate application of sponges, leaving these *in situ* until I have finished the separation and removal of the tumor."

GYNÆCOLOGICAL.

OVARIOTOMY.

Pedicle Clamps.

"Suppose the tumor separated and withdrawn, the assistant, stationed opposite the operator, should immediately insert one or two sponges to prevent the exit of the intestines, and he should then take possession of the tumor and steady it while the surgeon examines the pedicle and determines how it may be best dealt with."—"Diseases of the Ovaries." Lawson Tait.

Securing the Pedicle.

"This, which constitutes one of the most important steps of the operation, is at times easily and satisfactorily accomplished, while at others it is invested with great difficulties. Unless the pedicle be excessively short, the sac may be drawn outside of the abdomen and its pedicle grasped by the fingers. When very short it has to be manipulated in the abdomen. It may be managed after one of the following methods, that one being selected which best meets the requirements of the particular case.

"1st. The pedicle may be constricted by a clamp and held outside of the abdominal cavity.

"2d. The pedicle may be securely ligated and held between the lips of the wound by pins or sutures.

"3d. The pedicle may be transfixed by double ligatures, which, being cut short, is dropped into the pelvic cavity.

"4th. The tumor may be enucleated.

"5th. The pedicle may be constricted by a temporary clamp and severed by the actual cautery.

"No rule can be given with reference to a choice between all these methods other than this: when the pedicle is long and slender, it does not appear to matter very much which plan is selected, for all have yielded and are daily yielding excellent results; but, when it is very short, the external does not promise nearly so well as the internal method of managing the stump. As to the special cases for applying the different plans, the following suggestions, not rules, may be of service:

"a. The *clamp* is applicable to long pedicles, requiring powerful ligation, and presenting a large amount of tissue for suppuration and decay.

"b. *Ligation* and return is applicable to tumors with pedicles too short for treatment by the clamp and to slender pedicles.

"c. *Enucleation* gives a method of removal of tumors which have no pedicles.

"d. *The actual cautery* should again be fully tried, for its utility, since the experience of Mr. Keith, may now be considered beyond question. Where it is employed deep in the pelvis, Storer's clamp-shield (Fig. 3711) is an excellent adjuvant for prevention of hæmorrhage during its use and a good protection to the surrounding parts."—"Thomas, On Diseases of Women."



FIG. 3696.—Spencer Wells' Pedicle Forceps (Angular).

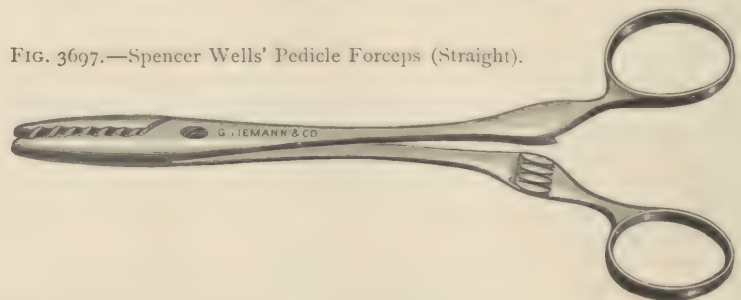


FIG. 3697.—Spencer Wells' Pedicle Forceps (Straight).

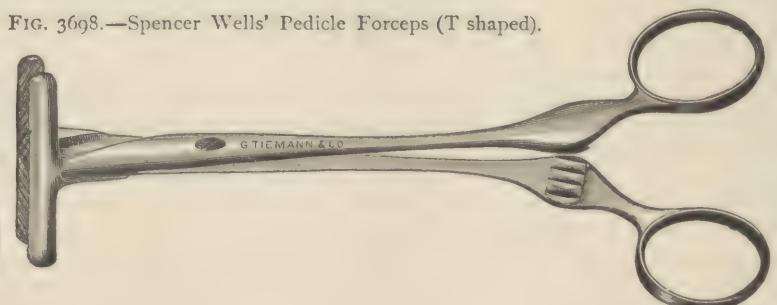


FIG. 3698.—Spencer Wells' Pedicle Forceps (T shaped).

GYNÆCOLOGICAL.

OVARIOTOMY.

Pedicle Clamps.

"At present, we may say, there are only three methods in vogue for the treatment of the pedicle, and of these one—that is, the clamp—should be reserved for extremely exceptional instances. Probably not more than two or three cases in a hundred require now to be dealt with by the clamp; certainly I have not met with more than one for the last three years. The kind of pedicle requiring the clamp is thick and soft, and so short as to contain, perhaps, a small piece of the tumor. With such a pedicle the extra-peritoneal method is admissible, and probably is superior to treatment either by the cautery or the ligature; but I am not quite sure that a combination of a drainage-tube with either of these latter methods may not yet be found superior to the clamp. If to the pedicle of an ovarian tumor, unusually thick and short, or in that of an uterine tumor, it is thought desirable to employ a clamp, then it is evident that what is wanted is a form of circular constriction by some means which will completely arrest the hæmorrhage, will not cut the pedicle, and which will allow the wound to be accurately adjusted around the stump.

"To meet all the requirements, I have devised a clamp (Fig. 3699) which has served my purpose better than any I have seen. After a large number of experiments I selected thick copper wire (No. 12, Birmingham gauge), nickeled, and completely softened by being made red hot and allowed slowly to cool, as being the best material to work with. For use I bent it into a loop (see right hand Fig. 3699, *A*), ready for the operation. After it has been placed around the pedicle, the collar is run on, close up to the pedicle. The handle with ecraseur mechanism *B* is then adjusted, the ends of the wires run through the holes and the pinch-screws closed tight upon the wires by means of the key, *C*. The handle *B* is then turned slowly till the loop of wire firmly constricts the pedicle. The tumor is then removed, and, if there be any bleeding, a few more turns of the handle *B* will secure it. When this is done, the pinch-screws of the collar *A* are to be securely tightened down on the wire and those on the handle *B* loosened. The handle will then come off, leaving the wire clamp with its collar *A*, as seen in the right hand figure. The ends of the wire are then to be turned slightly up, and the wound closed and dressed as usual."—"Diseases of the Ovaries." Lawson Tait.

FIG. 3699.—Lawson Tait's Clamp.

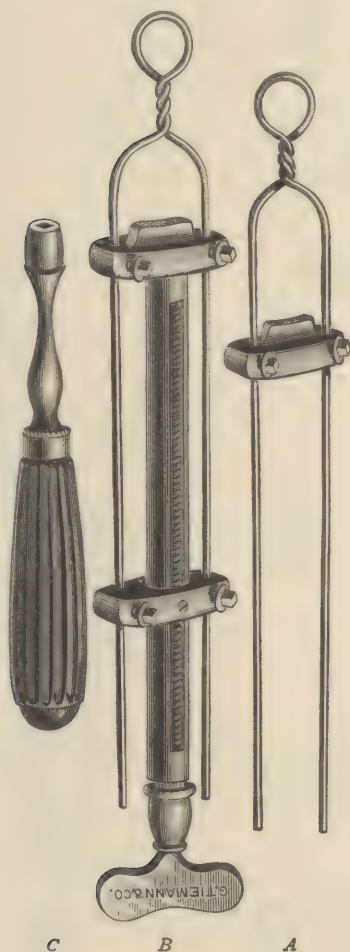


FIG. 3700.—Thomas' Clamp.

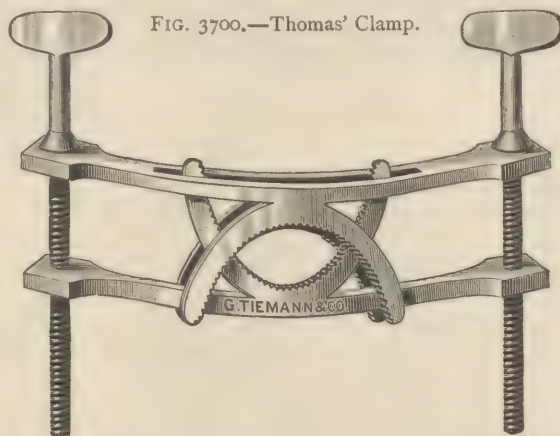
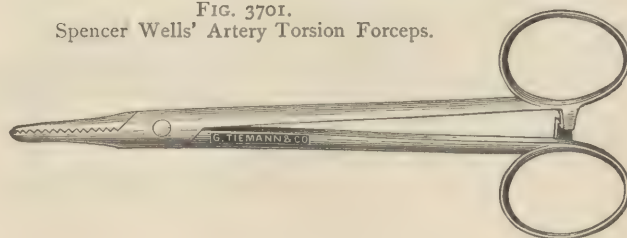


FIG. 3701.
Spencer Wells' Artery Torsion Forceps.



GYNÆCOLOGICAL.

OVARIOTOMY.

FIG. 3702.—Spencer Wells' Pedicle Clamp.
Consisting of 3 Clamps, 1 set of Levers for Closing and 1 set for Removing them.

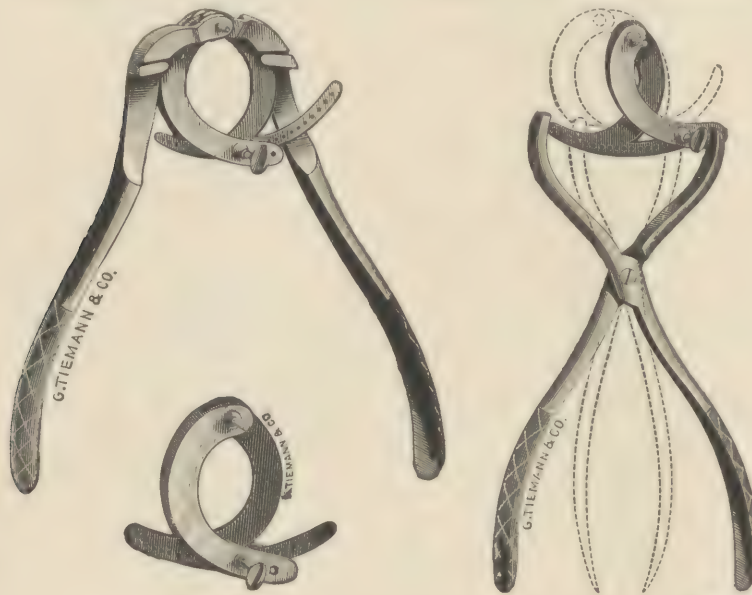


FIG. 3703.—Spencer Wells' Clamp Forceps.

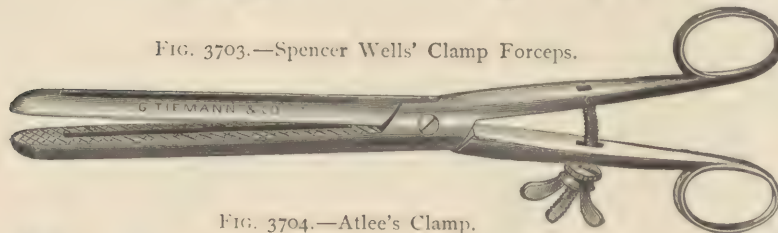


FIG. 3704.—Atlee's Clamp.

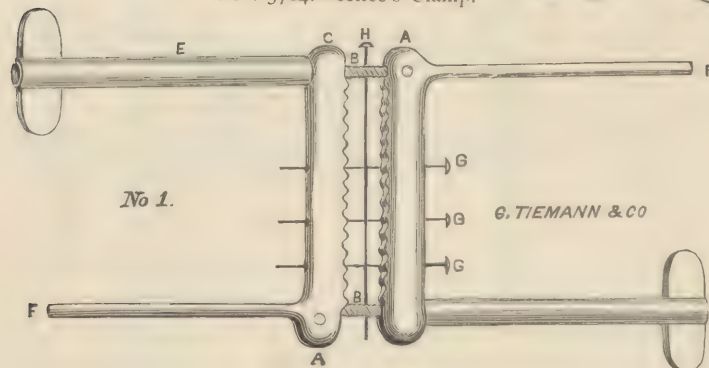
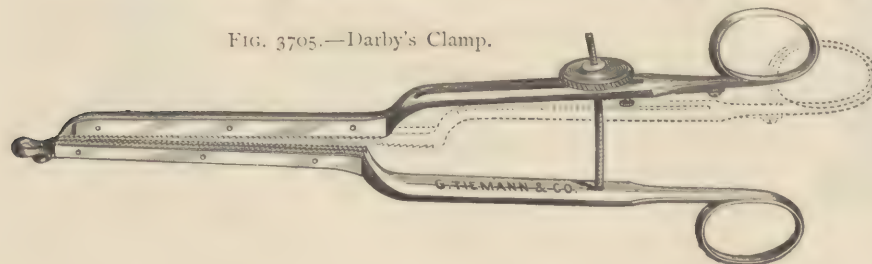


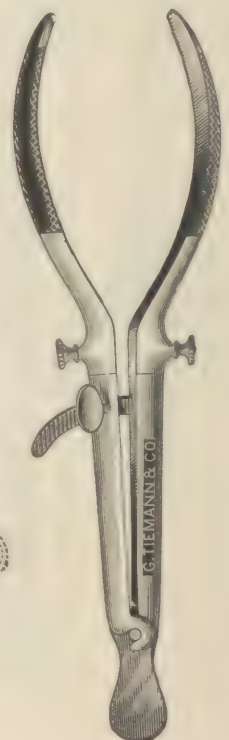
FIG. 3705.—Darby's Clamp.



Pedicle Clamps.

"The clamp has always been the favorite means used by Sir Spencer Wells, and the endorsement of the value of the instrument by one who has already removed more than nine hundred ovarian tumors demands for it more than a passing notice. There are two great advantages in the use of the instrument—bleeding from the pedicle cannot take place without being detected, and no foreign body in connection with the pedicle is left within the abdominal cavity. On the other hand, unless the pedicle is a long one, the patient suffers in consequence of the traction exerted when the abdomen becomes distended by flatus. Sir Spencer Wells has modified, from time to time, the shape of the clamps."—"Principles and Practice of Gynæcology." Emmet.

FIG. 3706.—Baker Brown's Clamp.



GYNÆCOLOGICAL.

OVARIOTOMY.

Pedicle Clamps.

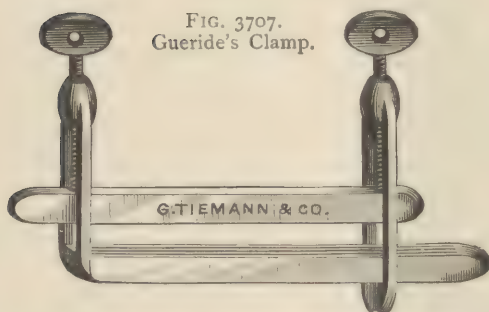
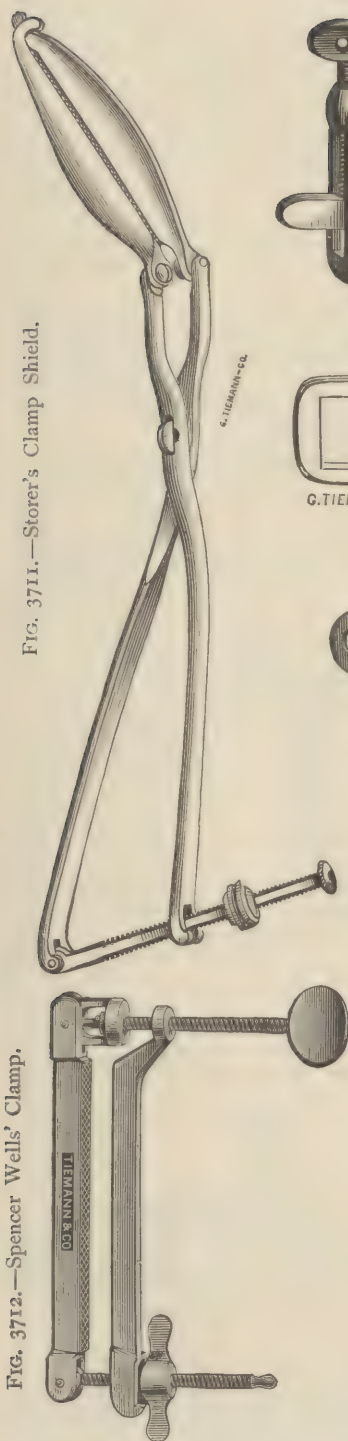


FIG. 3708.
Not's Rectilinear Ecraseur.

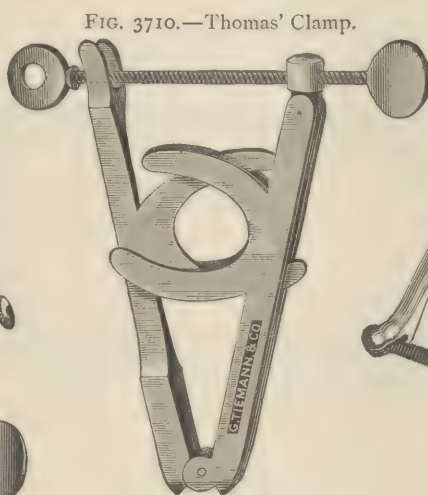
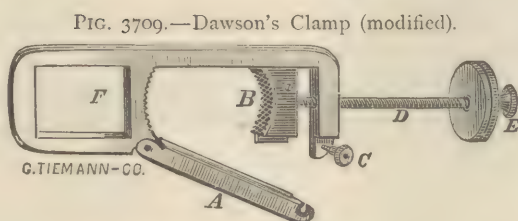
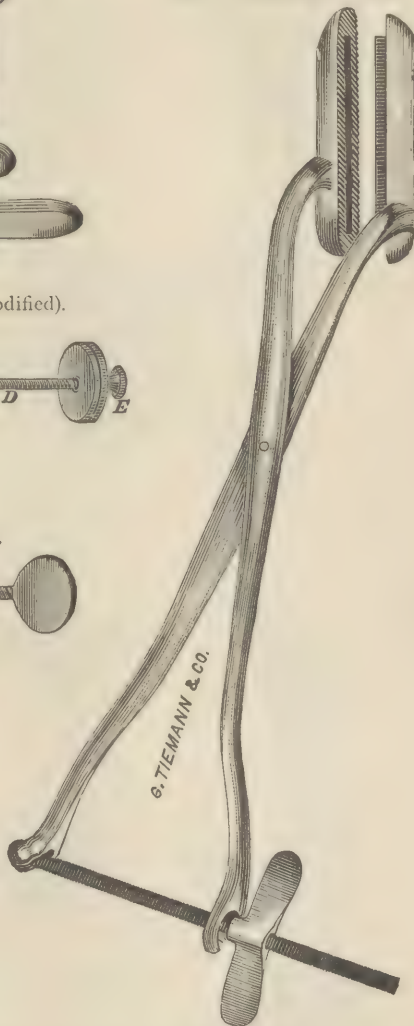
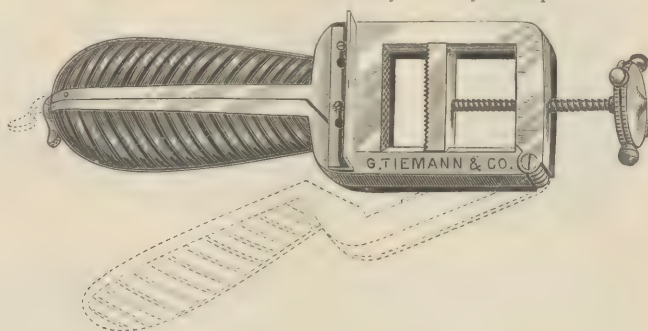


FIG. 3713.—Skene's Ovariectomy Cautery Clamp.



GYNÆCOLOGICAL.

OVARIOTOMY.

Pedicle Clamps.

"This is a loop and knot-constrictor, furnishing continuous tension. After the wire or cord is applied to the pedicle and crossed—one end above the other and pulled in opposite ways, so as to form a single knot—the tag-ends are passed through the apertures on the extremity of the forceps, next over the grooved pulleys in the middle of the branches, then wound once or twice around the neck of the windlass and finally secured to its wings in figure of eight fashion. By now turning the windlass, the wire becomes tightened. Turning the screw at the handles results in separating the branches in front; these, being resilient, are thus influenced to act like strong bows, continually endeavoring to straighten, creating a never-ceasing tension upon the opposite ends of the wire or cord forming the knot."—Docteur Forné, Médecin Principal de la Division Navale (France). Verbal explanation by the Doctor when visiting us. New York, October, 1885.

FIG. 3714.—Forné's Serre-Nœud.

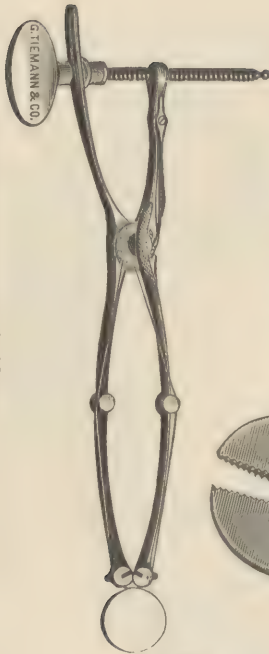


FIG. 3715.—Esmarch's Ovariectomy Clamp.



FIG. 3716.—Keith's Compressing Forceps.



FIG. 3717.—Skene's Compressing Forceps.

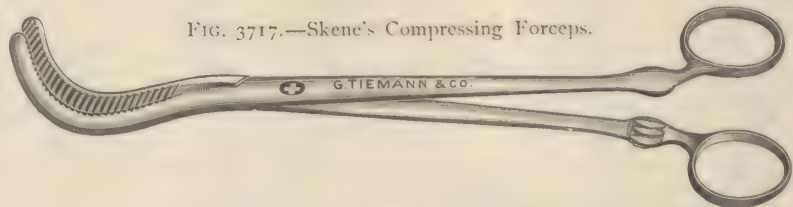
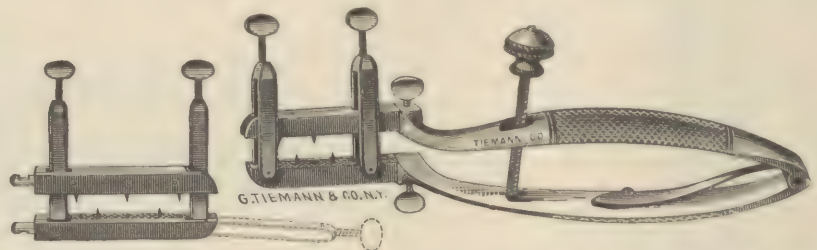
FIG. 3718.—Byford's Clamps.
Consisting of 2 Clamps and 1 pair of Lever Forceps.

FIG. 3719.—Keith's Ovariectomy Clamp.



"Cleansing the Peritoneum.—The sac having been removed and hæmorrhage checked, all fluids contained in the peritoneal cavity should be carefully removed by soft sponges, squeezed out of warm carbolized water. Not only the intestines and abdominal walls, but especially the pelvis, should be completely and thoroughly cleansed. This is a point of great importance, and may decide the issue of the case. Every particle of fluid left may undergo decomposition and expose to the great dangers of septicæmia and peritonitis.

GYNÆCOLOGICAL.

OVARIOTOMY.

Drainage.

“Establishing Drainage.”—No one familiar with ovariectomy will to-day doubt the assertion that the two factors which prove most fatal after it, septicæmia and peritonitis, are both in great degree due to the retention of putrescent materials within the peritoneal cavity. These materials may have escaped from the cyst during or before the operation, may consist of blood or serum oozing from the vessels while the operation proceeds or some hours after it has ended, or arise from emptying of pus into the peritoneum from inflammatory action. The importance of not only preventing the entrance of such elements into the peritoneum and of removing them before closing the abdominal opening, but also of giving them free vent during the period of convalescence has attracted the attention of many ovariectomists.

FIG. 3720.—Thomas' Curved Drainage Tube.

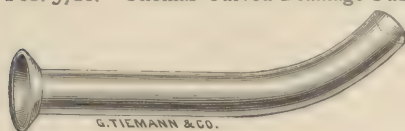


FIG. 3721.
Thomas' Straight Drainage Tube.

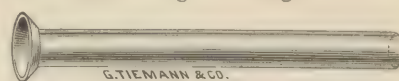


FIG. 3722.
Thomas' Perforated Drainage Tube.

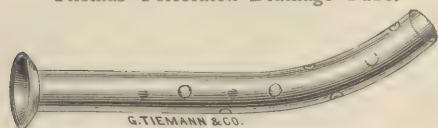
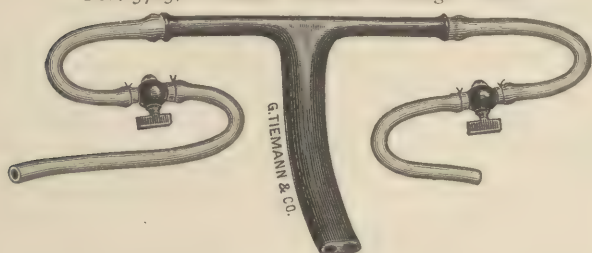


FIG. 3723.—Thomas' Double Drainage Tube.



“Peaslee introduced the plan of leaving a cloth tent in the lower angle of the wound in order to facilitate drainage in case of the development of septicæmia. Kœberlé not only inserted channels of metal through the abdomen, but even opened the cul-de-sac of Douglas and inserted tubes, so as to drain per vaginam, and Sims, more recently, has urged this plan as one very greatly calculated to diminish the liability to these conditions.

“The removal of the cloth tent, fixed between the lips of the wound by congealed blood, is often difficult and painful, and the passage of a catheter or other tube down into Douglas' sac, the most dependent part of the peritoneum, is not rarely impossible after a slight effusion of lymph has occurred.

“For the past fifteen years, whenever, from the remaining of a portion of the sac in the pelvis, or from escape of fluids into the pelvic peritoneum, drainage has seemed advisable, I have, until recently, employed for this purpose a curved glass

tube, which entered and rested in Douglas' pouch. This was kept closed by a cork or by a roll of carbolized cotton, and through it the pelvis was syringed out with carbolized water, carried in by a catheter if symptoms of septicæmia developed. Since the use of antiseptic dressings I have, however, discarded this, and now employ a double tube with lateral branches, which pass out through the antiseptic dressings. This renders it unnecessary to disturb it when washing out the abdominal cavity, and the rubber tubing with stopcocks arranged at the extremities of the lateral arms enables us to exclude air very perfectly. The two halves of the tubes do not communicate. As it is forced in through one lateral branch the fluid runs out at its lowest extremity, rises in the cavity, and escapes through the other tube. Obstructing the escape tube will more completely fill the cavity with fluid, if this be considered desirable.”—Thomas, on “Diseases of Women.” 1880.

FIG. 3724.—Tait's Drainage Tube.



FIG. 3725.—Keith's Drainage Tube.

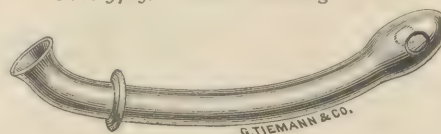


FIG. 3726.—Schapp's Hard Rubber Spiral Drainage Tube.



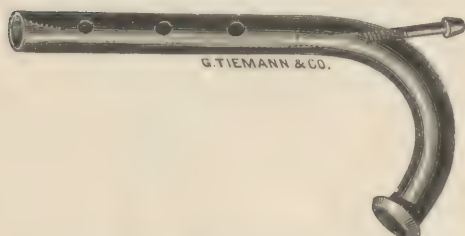
Is very pliable, elastic, and admits an easy outflow of septic fluids.

GYNÆCOLOGICAL.

OVARIOTOMY.

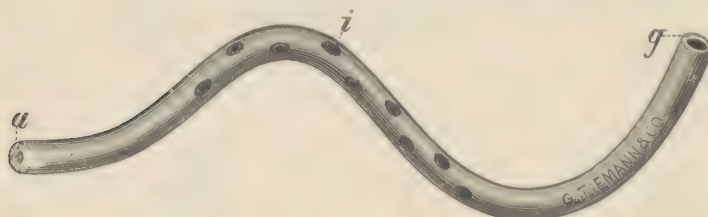
Drainage.

FIG. 3727.—Sims' Drainage Tube.



convenient vessel. Where drainage is constant or very profuse, the rubber tube can be long enough to hang over the side of the bed into some vessel placed there. By having the smaller, or washing tube, project through the dressing on the wound, the pelvic cavity can be washed out without removing the dressing, which will remain dry and clean."—H. Marion Sims, M. D. *N. Y. Medical Journal*, Sept. 20, 1884.

FIG. 3728.—Howe's Soft Rubber Drainage Tube.



a syringe. The tube is to be removed downwards by pulling upon the part projecting into the vagina."—Extract from *The Eclectic Medical Journal*, January, 1886.

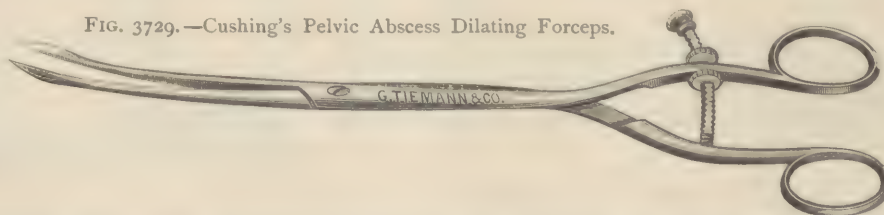
"It consists of a large and a small tube made of hard rubber. The smaller tube is inside of the larger one, running along the posterior wall and terminating about an eighth of an inch from the bottom. The large tube is perforated on the sides and curved at the top, so that, when in the abdominal wound, the top of the tube projects nearly over the symphysis pubis. The smaller tube is for the purpose of washing out the peritoneal cavity, the water being thrown in at the bottom of the cavity instead of at the top, as in most drainage tubes. A Davidson's syringe is attached to the small tube and a larger rubber hose to the other, which conveys the water to a bed-pan or other

"A few months ago I devised a flexible drainage tube to be used in ovariectomy. The implement is long enough to reach from the abdominal incision to the ostium vaginae, passing through the peritoneo-vaginal septum on its way. The tube is of rubber and pierced with 'velvet-eyed' apertures along its middle third. The diagram well represents the implement. After an ovarian tumor is removed, and soiled parts have been cleaned, a large

trocár is sent to the vaginal fornix which is proximate to the rectum, and there made to transfix the peritoneo-vaginal septum, the grouped fingers of the left hand, in the abdominal and pelvic cavities for that purpose, receiving and guarding the point of the instrument. The trocár is then removed, and the smaller end of the drainage tube directed through the canula. The fingers of the right hand withdraw the canula, leaving the lower end of the drainage tube in the vagina. The upper end of the tube projects from the lower angle of the abdominal wound when the incision is closed. The object of the flexible tube is to drain the abdominal and pelvic spaces of septic fluids exuded directly after ovariectomy and hysterectomy. Besides, the flexible conduit offers facilities for injecting aseptic fluids within the peritoneal cavity in the event of dangerous inflammation. By means of the implement septic surfaces may be frequently bathed with warm water thrown through

FIG. 3729.—Cushing's Pelvic Abscess Dilating Forceps.

For opening
pelvic abscesses
through the
roof of the vagina.



It consists of two blades, which, when closed, form a trocár, and, when introduced and the handles compressed, acts as a dilator, tearing the tissues sufficiently to furnish the most ample room for escape of pus and the introduction of a drainage tube.

GYNÆCOLOGICAL.

OVARIOTOMY.

Closing the Wound.

“Closing the Wound.—This is accomplished by two sets of sutures, the deep and superficial. The first, composed of silver, may be passed in the following manner: A thread of silver wire is passed at each of its extremities through a long and stout straight needle. One of the needles, being grasped by strong needle-forceps, is passed through the peritoneum of one abdominal flap near the edge of the incision and made to emerge through the skin about an inch from the edge. Then the other needle is seized and passed through the other side. The suture is then secured by twisting.

FIG. 3730.—Keith's Needles.



These deep sutures, placed at the distance of half an inch apart, will bring the whole incision into contact from the peritoneum to the skin, and favor healing by first intention.

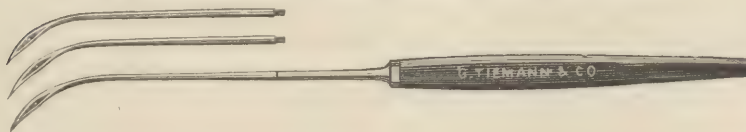
“A much better method is to pass through both walls of the abdomen a long needle with fixed handle, and an eye near its point armed with a short loop of silk, as recommended by Peaslee. Into this loop or into the eye of the needle a bit of metallic wire is fitted and immediately drawn into place. Besides these, superficial sutures or pins like those employed for harelip should be used, which pass through the skin and areolar tissue, but do not involve the peritoneum. Around this pin thread is wrapped in ‘figure of eight.’

FIG. 3731.—Abdominal Needle, with Fixed Handle.



FIG. 3732.—Peaslee's Perineum Needles, Detachable Handle.

See
HARELIP PIN,
Fig. 2318.
ACUPRESSURE
PIN, Fig. 1469.

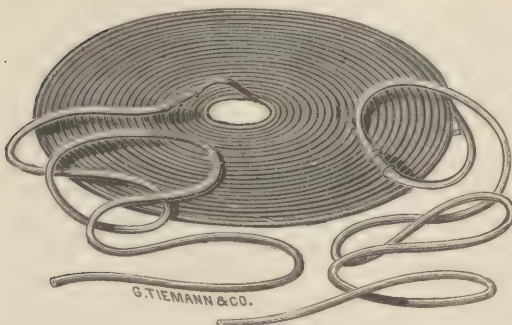


See HAGEDORN'S
NEEDLES
AND HOLDER,
page 455.

“The operation having been performed under Lister's method throughout, the wound is now covered with anti-septic dressing, which is secured in place by a heavy covering of carbolized cotton, and this again by a firm bandage. Then the patient should be removed from the table to her bed. * * *

“Hæmorrhage, Peritonitis, Nervous Prostration, Septicæmia.—The evils which are chiefly to be feared as sequels of the operation are, within the first twenty-four hours, *hæmorrhage*; from second to fourth day, *peritonitis*; from completion of operation to third or fourth day, *nervous prostration*; and from fourth to fourteenth day, *septicæmia*.”—“Thomas on the Diseases of Women.”

FIG. 3733.—Abdominal Pad, for Application of Heat or Cold.



Cold Water.

“Cold Water.—This agent has been more systematically employed than formerly in the after-treatment of surgical cases. An old invention, but one recently reintroduced, is the cold water coil; which consists of coils of rubber or metal tubing of all shapes and sizes. These may be placed upon the head, spine, abdomen, or around a wounded limb, and kept cool by the action of a constant stream of ice-water flowing through them. This appliance is most efficacious in subduing inflammation and lowering fever. It is especially useful in peritonitis following operations within the abdominal cavity.”—“Appleton's Annual Cyclopædia.” 1884.

GYNÆCOLOGICAL.

OBSTETRICS.

Labor, or Parturition.

"*Obstetrix*: Lat., a midwife, the art and science of midwifery.—It has a double mission: 1. To render possible, easy and regular, exempt from all abnormal suffering and all danger, the accomplishment of the numerous functions which directly or indirectly affect generation, from birth to age when the procreative faculty becomes natural to the human female; 2. To direct and defend from all harm the delicate and precarious health of the infant during its early period of existence, and particularly during lactation. *Labor* is a natural function, and happily the intervention of art is rarely demanded; but, to foresee, prevent, or remove all possible danger; to overcome serious obstacles when they exist, to resolve the many difficult and trying questions that may arise, demand skill and judgment. The important part which woman takes in generation consists in successive acts which are accomplished in her. One of the germs or ova, enclosed in the ovary, receives through impregnation the power to develop itself, and is then transported to the uterus. This organ retains the ovum, and furnishes it the materials for its growth. It becomes first an embryo, and next a fœtus, when it acquires all the necessary powers for exterior life. This succession of phenomena constitutes gestation or pregnancy. When these powers are acquired, the new being is expelled by a spontaneous action of the same organ which has contained, protected and nourished it; and during this expulsion, known by the name of labor or parturition, in order to come to the light, it is obliged to traverse the pelvis, which is not accomplished without pain. But after its birth it still requires for some time the aid of the breasts, organs designed only for the function, which by the process of lactation furnish the necessary elements for its nutrition. The development of these phenomena is preceded and prepared for by particular modifications which the ovarian vesicles undergo. A bloody periodical discharge, called menstruation, of which the uterus is the source, ordinarily coincides with this modification of the ovarian vesicles.

"Obstetrics then includes: 1. Anatomy, the organs which concur to the execution of the acts above described; 2. The physiological phenomena, the mode in which these acts are performed; and, 3. The pathology of these organs. As regards the anatomy, it is sufficient here to say that the female organs subservient to generation are the ovaries, the principal function of which is the production of the ovule or germ; the Fallopian tubes, designed to receive the ovule and conduct it into the cavity of the uterus; the uterus or womb, a kind of receptacle whose office is to contain the fecundated germ during its period of development, and to expel it immediately afterward; and, finally, the vagina, a membranous canal extending from the neck of the uterus to the external organs. Most of these organs are situated within a large cavity, the walls of which are composed of bones and soft parts; this is termed the cavity of the pelvis. * * *

"*Labor or parturition* consists in the spontaneous or artificial expulsion of a viable fœtus through the natural parts. Previous to the commencement of labor, some precursory phenomena appear—in some cases during the last fortnight of pregnancy, in others only five or six days before labor commences. They result from the dilatation of the internal orifice of the womb. The uterus, which before extended up to the stomach, sensibly sinks lower, the mechanical obstruction to respiration is removed, the stomach is no longer oppressed, but the bladder and rectum become irritable and locomotion is more difficult. The physiological phenomena of labor are divided into three stages: the first stage ends with the dilatation of the mouth of the womb, the second with the expulsion of the fœtus, and the third with the delivery of the placenta or after-birth. The symptoms of the first stage are intermittent pains, resulting from the uterine contractions, discharge of a glairy mucus, formation of a bag of waters, and gradual dilatation of the neck of the womb. The pains of the first stage are usually borne with more impatience than those of the second. The cries which accompany them are sharp, and resemble those of any other species of suffering; those of the second stage seem to be suppressed, like those of a person carrying a heavy burden. The use of the glairy discharge is to moisten and lubricate the parts over which the child has to pass, to increase their suppleness and extensibility, and make it more easy for the ovum to slide over the surfaces. Where these discharges fail to take place, the dilatation of the mouth of the womb is always more painful and slower, and the organs are more disposed to become inflamed. The name of a bag of waters is given to a protuberance formed by the membranes in the upper part of the vagina during labor. During the presence of pain it is hard, tense and elastic; after the contraction is over it becomes wrinkled and contracts or disappears. It eventually breaks, sometimes early in the first stage, and in other cases not until late in the second stage, when the contained fluid escapes. The duration of labor is exceedingly variable, even when no obstacle opposes its natural course. Some women are delivered in an hour or two, others only after several days; and between these two extremes there is every intermediate grade. In the first confinement, the average length of labor is usually from ten to twelve hours; but, in at least one case out of five, it may not terminate under fifteen, eighteen, or even twenty-four hours, and this without any injury whatever resulting either to the mother or child. Women who have had children are delivered much sooner, only suffering, in ordinary cases, about six or eight hours. The duration of the first stage is to the second as two or even three to one; but this law is subject to many exceptions. The third stage ought to be completed within thirty minutes. To understand the mechanical phenomena of labor it is necessary first to define the terms presentation and position. We designate by the term presentation the part of the child that first offers at the entrance of the pelvic cavity; and by the term position, the relations of the presenting part to the differ-

GYNÆCOLOGICAL.

OBSTETRICS.

Difficult and Dangerous Labor. (Continued.)

ent points of the entrance to the pelvis. The attitude of the child in the uterine cavity is, in a great majority of cases, such that the direction of the trunk is parallel with that of the mother, and one extremity forms the most dependent part. If the head is flexed, it is called a vertex presentation. If the head is extended back, the chin far removed from the breast, it is a face presentation. When the other extremity presents, the legs are usually flexed on the thighs and the latter on the abdomen; the whole breech may therefore offer at the entrance of the pelvis, or one or both feet or knees. As the mechanism of labor must be the same in all these cases, they are all included under the term pelvic presentations. But it may happen that, instead of one of the extremities offering, some portion of the trunk may offer, the child lying transversely in the uterus, and this may be either some point of the right half or of the left half of the trunk. We have then five primary presentations, one of the head, one of the face, one for the pelvic extremity, one for the right lateral plane, and one for the left lateral plane. The presentation of the head is incomparably more frequent than all the others. According to Mme. Boivin, in 20,357 cases it occurred in 19,730. The foetus presents by the face, on an average, once in two hundred and fifty labors. The pelvic presentation occurs once in thirty or thirty-five labors. The trunk presentations are a little less rare than the face, occurring about once in two hundred cases. As a law, it may be said that trunk presentations always demand the interposition of art to accomplish delivery. The other presentations generally terminate spontaneously. In order that a labor may terminate without foreign aid, there must be on the part of the mother no fault or deformity of the pelvis, no serious affection of the womb, and the organ must possess a certain energy; the general powers of the system must not have been exhausted, either by a profuse hæmorrhage or any long continued disease; there must be no affection making it dangerous for the women to give herself up fully to the efforts that she is compelled to make; and no accident must supervene during the labor. On the part of the child, it is important that it should descend with the head, the face, the feet, the knees, or the breech foremost, and that it should not be of a size disproportionate to the pelvis. About one case in thirty requires, in some form, artificial aid to complete a happy delivery.

Obstetric Operations.

"The obstetric operations required for cases of difficult and dangerous labor, either to save the life of the mother or child, or both, are: 1. Induction of premature labor, an operation of great importance and value in certain cases; 2. Version or turning, that manual operation by which one presentation is substituted for another less favorable; 3. The vectis, to correct malpositions or aid the natural rotations of the head; 4. Delivery by forceps; 5. Craniotomy, an operation by which the life of the child is sacrificed in order to save the mother; 6. The Cæsarean section, in which the child is extracted through an incision in the walls of the abdomen and uterus. The dangerous complications which may arise in connection with labor are: Prolapse of the cord or funis, an accident very fatal to the child; flooding or hæmorrhage; retention of the placenta; convulsions; rupture of the uterus; lacerations of the vagina or perineum, and inversion of the uterus.

"Among the most striking modern improvements in obstetrical science may be mentioned the application of auscultation to obstetrics; a more perfect knowledge of the mechanism of labor and of the management of the *placenta prævia*; the introduction of anæsthetics; the induction of premature labor; an increased frequency in the use of the forceps and a less frequent resort to craniotomy; and the substitution of version in cases where either craniotomy or the long forceps were formerly employed."—"The American Cyclopædia."

Instrumental Labor.

Instrumental cases of difficult labors are divided by Ramsbotham into two species, he says: "The *first*, those which are accomplished by instruments perfectly compatible both with the life of the child and the safety and continuity of the mother's structures; and the *second*, those in which either the child's body must be mutilated or a cutting operation be performed on the mother's person.

Delivery Instruments. Forceps, Vectis and Fillet.

"Four kinds of instruments, differing essentially in their fashion and mode of application, have been used to overcome the lesser degrees of difficulty which we meet with; by the employment of either of these the labor is reduced to the first species of this order: they are the long and short forceps, the vectis and the fillet.

Craniotomy, Cæsarean Section.

"The instruments resorted to in the second species of this order of cases are of a cutting character, and they may be resolved into two varieties—the *first*, those which are applied to the child and are necessary for the performance of craniotomy, as the perforator or craniotomy scissors, the crotchet, the blunt hook, and the craniotomy forceps; the *second*, those which are applied to the mother's person, by which the Cæsarean section is performed or the symphysis pubis is divided, as the scalpel, bistoury and others, which are auxiliary, and sufficiently well known in surgery to require no particular mention here."—"Ramsbotham's System of Obstetrics."

GYNÆCOLOGICAL.

OBSTETRICAL.

Forceps.

FIG. 3734.—Hodge's Forceps.

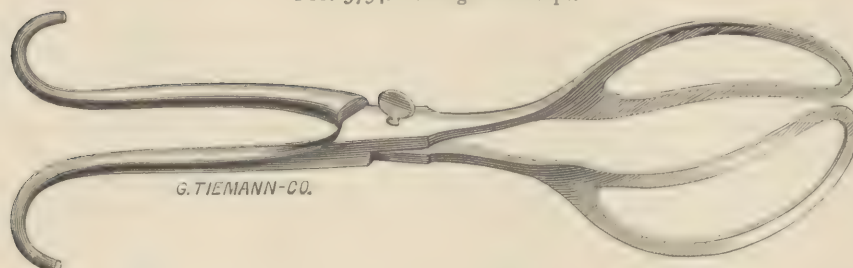
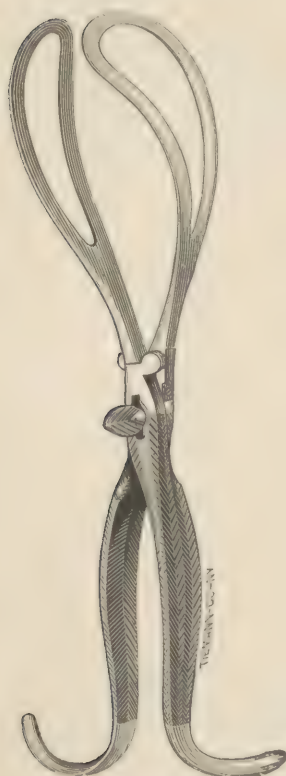
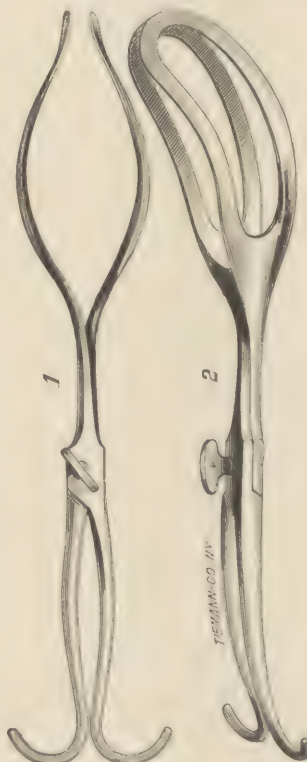
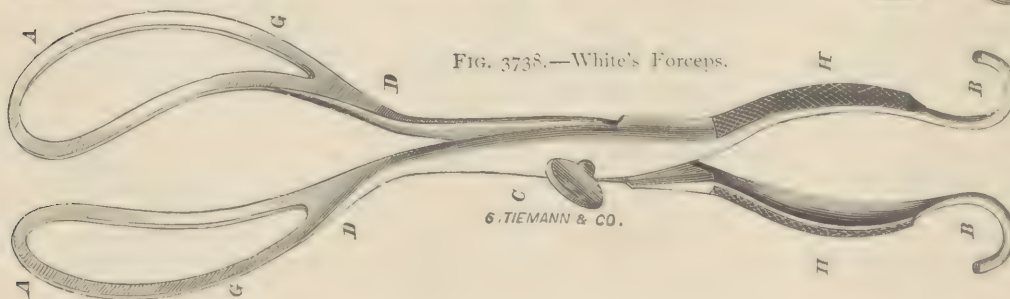
FIG. 3735.
Tarsitani's Forceps.FIG. 3736.
Brickel's Forceps (1, 2).FIG. 3737.
Robinson's Forceps.

FIG. 3738.—White's Forceps.



GYNÆCOLOGICAL.

OBSTETRICAL.

Forceps.

FIG. 3739.
Bethel Forceps.



FIG. 3740.
Hunter's Forceps.

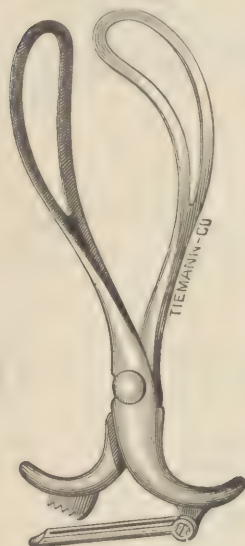


FIG. 3741.
Sawyer's Short Forceps.



FIG. 3742.
Comstock's Forceps.



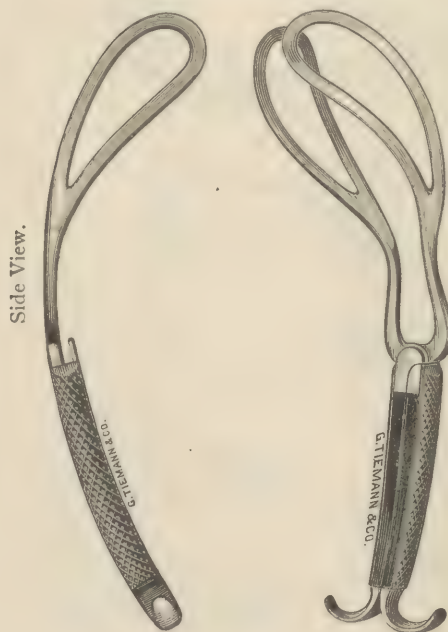
FIG. 3743.
Cole's Forceps.



FIG. 3745.
McFerran's
Forceps.



FIG. 3744.—Sawyer's Long Forceps.



Side View.

GYNÆCOLOGICAL.

OBSTETRICAL.

Forceps.

FIG. 3746.—Taylor's Forceps.

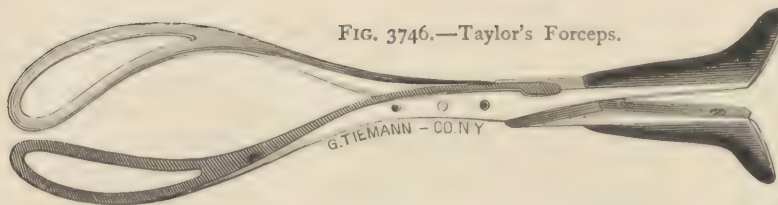


FIG. 3747.—Elliott's Forceps.

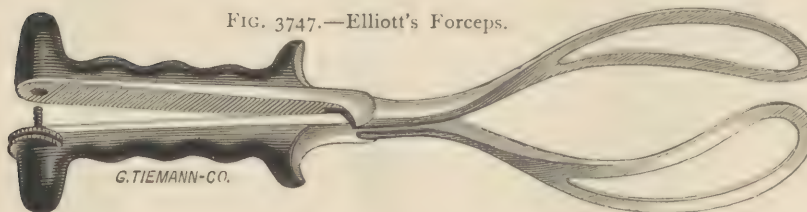


FIG. 3748.—Gillette's Forceps.



FIG. 3749.—McLean's Forceps.

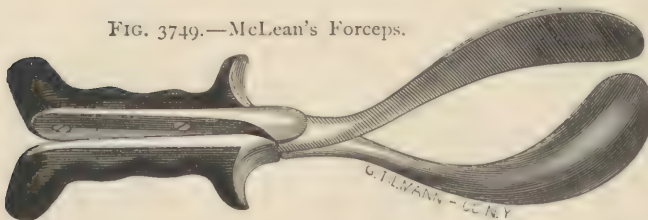


FIG. 3750.—Osborn's Forceps.



FIG. 3751.—Denman's Forceps.

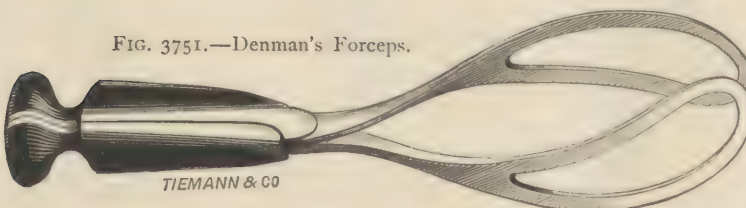


FIG. 3752.—Thomas' Forceps.

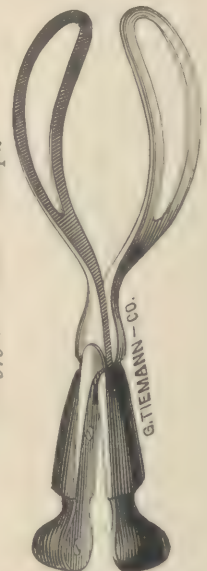
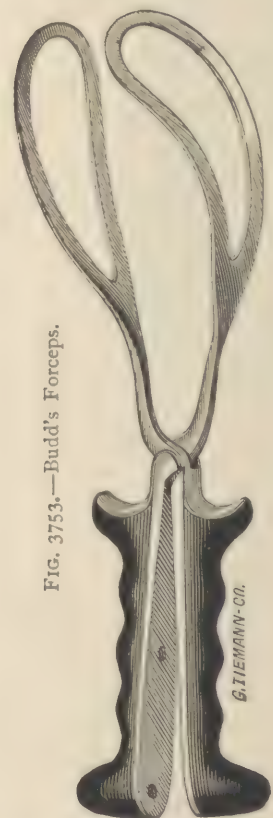


FIG. 3753.—Budd's Forceps.



GYNÆCOLOGICAL.

OBSTETRICAL.

Forceps.

FIG. 3754.
Davis' Forceps.

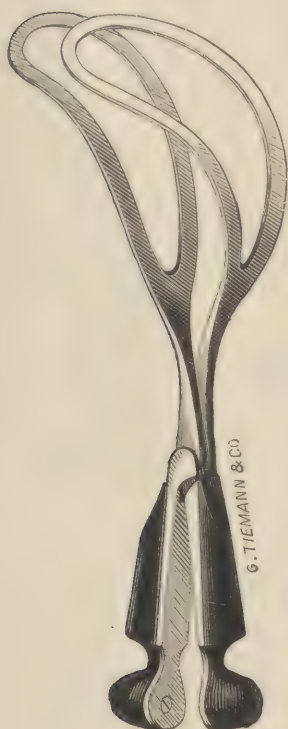


FIG. 3755.
Trueheart's Forceps.



FIG. 3756.
Jenks' Short Forceps.



FIG. 3757.
Jenks' Long Forceps.



FIG. 3759.
Blake's Forceps.

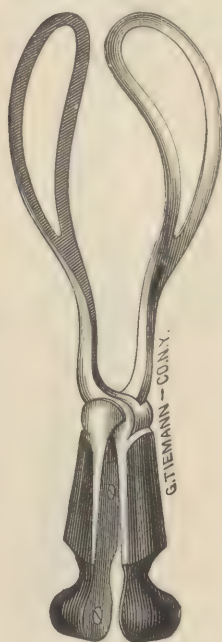


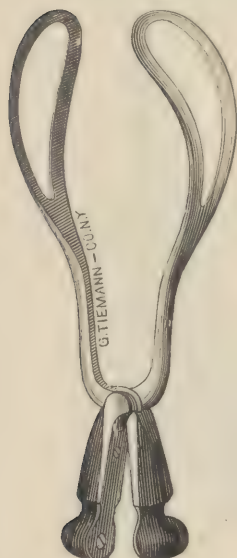
FIG. 3760.
Sawyer's Forceps.



FIG. 3761.
Buzzle's Forceps.



FIG. 3758.
Ives' Forceps.



GYNÆCOLOGICAL.

OBSTETRICAL. Forceps.

FIG. 3762.—Bedford's Forceps.



FIG. 3763.—Miller's Jointed Forceps.



FIG. 3764.—Draper's Forceps.

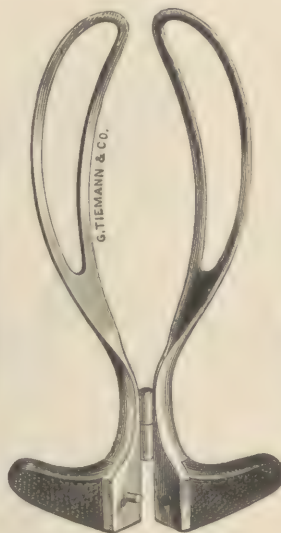


FIG. 3765.—Roller's Forceps.



FIG. 3766.—Newman's Forceps.

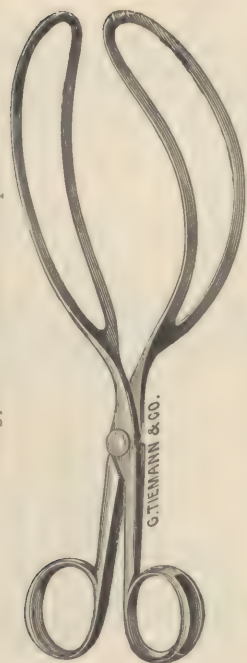
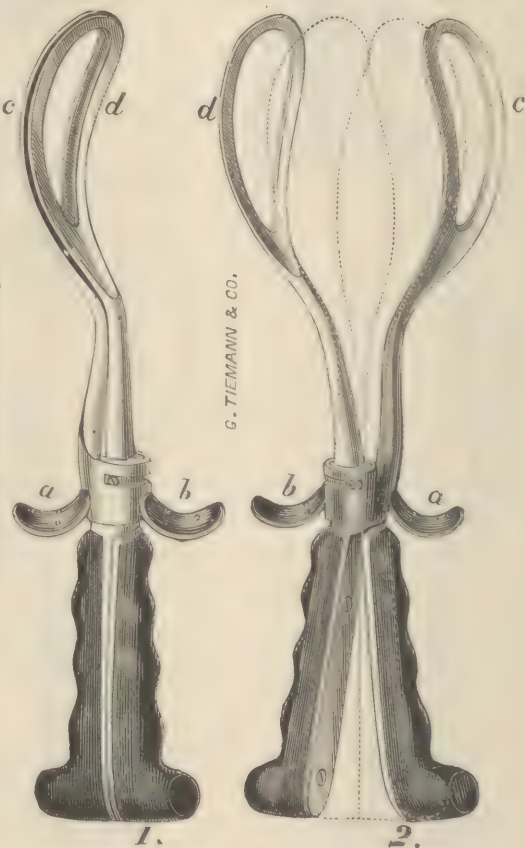


FIG. 3767.—Vedder's Forceps.



FIG. 3768.—Lowenthal's Forceps, (1, 2).



GYNÆCOLOGICAL.

OBSTETRICAL.

Forceps.

FIG. 3769.
Hale's Forceps.



FIG. 3770.
Rockwell's Forceps.



FIG. 3771.
Mathew's Forceps.



FIG. 3772.
Nægeli's Forceps.



FIG. 3773.
Schuyler's Forceps.



FIG. 3774.—Robertson's Forceps.

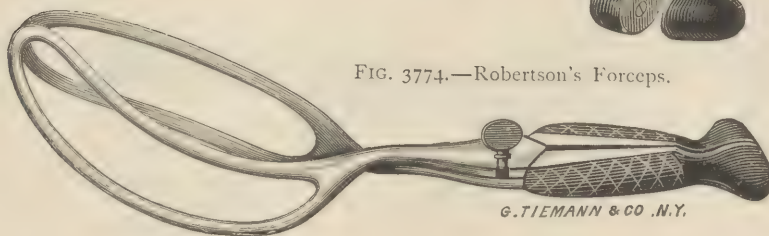
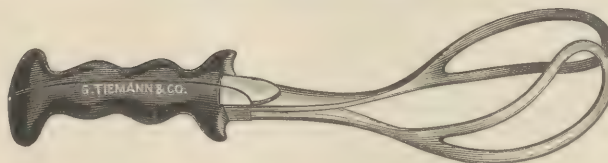


FIG. 3775.—Jewett's Forceps.



"I submit a forceps which is designed to meet the requirements of modern obstetricians in the matter of cleanliness. The only important new feature is the construction of the handles, which are of hard rubber, smoothly polished, and they wholly envelope the metal. As the rubber is vulcanized upon the metal there are no crevices for the lodgment of filth. With the exception of the handles, the general model of the instrument is similar to the Elliot forceps, but the shanks are stronger and the lock is a half Smellie."—"Notes on Hospital Obstetrics." Jewett. *New York Medical Journal*, November 21, 1885.

GYNÆCOLOGICAL.

OBSTETRICAL.

Forceps. (Axis-Traction, Continued.)

FIG. 3776.—Tarnier's Axis-Traction Forceps.

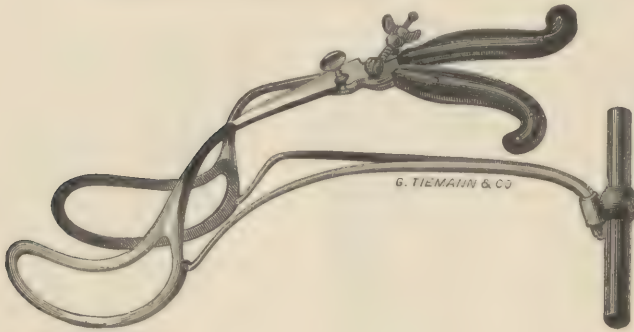
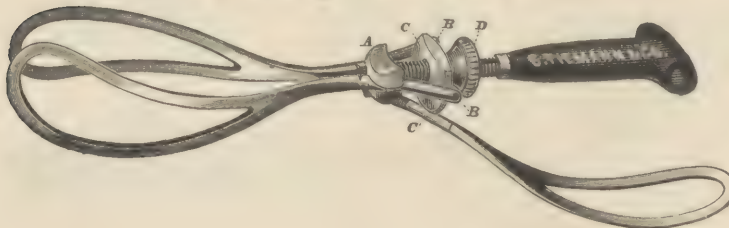


FIG. 3777.—Corning's Axis-Traction Forceps.



FIG. 3778.—Burge's Axis-Traction Forceps.



"Mr. Tarnier's forceps possesses two original features: 1. The shanks, in place of running forward continuous with the pelvic curve, are bent backward, so that the handles, when placed horizontally, lie about three and a half inches above the plane of the posterior curve of the blades. This Tarnier curve makes it possible to bring the blades well forward in the sides of the pelvis without subjecting the soft parts above, or the perinæum below, to pressure. A transverse screw, crossing the handles below the lock, approximates the blades to the surfaces of the child's head. 2. Two movable traction-rods are attached to the lower curvature of the blades. These rods are curved to correspond to the lower border of the shanks, to which, when not in use, they are affixed by projecting pegs. When the instrument is adjusted, the outer ends of the traction-rods are detached and inserted into a socket-joint belonging to a strong steel bar with a downward curve, and furnished with a transverse handle which can be moved in any direction by means of a universal joint. Traction is made by means of this transverse handle alone. As the head descends, the handles proper rise upward and serve as an index to show the direction in which the force should be exerted. By simply raising the traction-rods in a line with the curved shanks, the blades of the forceps swing always in the transverse diameter, and the head follows as nearly as possible the axis of the pelvis. To one accustomed only to

the familiar forceps, the facility with which delivery can be accomplished by Tarnier's instrument would seem hardly credible."—"The Science and Art of Midwifery." Lusk. 1882.

"The axis-traction forceps of Tarnier and its modifications offer great advantage in many cases of high operation. In these instruments the extracting force is applied in the axis of the forceps blades, and the axis of the blades lies constantly parallel with the axis of the passages as the head descends. This can not be accomplished by mere traction upon the handles, certainly not with forceps having a marked pelvic curve. It may be done by conjoining with traction, applied at the handles by one hand, a downward pressure with the other hand upon the shanks near the lock. The operator is often in doubt as to the precise direction of the pelvic axis. I am not sure to whom I am indebted for the following useful hints for solving this difficulty and guiding the line of traction. The symphysis pubis is substantially parallel with the axis of the brim. The direction of the symphysis may be readily determined by laying the finger along its internal surface or by placing the finger-tips externally over the extremities of the symphysis. This affords a guide to the line of traction, which deviates but little from the axis of the inlet till the occipital pole approaches the pelvic floor. As the head glides along on the floor of the pelvis the forceps handles should sweep forward rapidly enough to make the anterior margins of the blades hug the ischio-pubic rami as closely as possible without crushing the intervening soft parts. These rules serve for general guidance in the use of forceps, but may, of course, require modification in individual cases."—"Notes on Hospital Obstetrics." Charles Jewet, M. D. *N. Y. Medical Journal*, Nov. 21, 1885.

"Of Burge's forceps (Fig. 3778) the blades and handle are made separate, and the lock, being in the end of the handle, allows the choice from as many blades as one pleases to carry. The free extremities of the blades, B B, pro-

GYNÆCOLOGICAL.

OBSTETRICAL.

Forceps. (Axis-Traction, Continued.)

jecting on either side of the handle, form levers, by which the blades are separated or approximated at will, being acted upon by the slide, *CC*, which may be fixed at any point by means of the nut, *D*. The amount of compression which the blades shall make upon the foetal head is under perfect control."—J. H. BURGE, M. D.

Dr. Lusk has modified the original Tarnier by making the blades much lighter, somewhat after those of the well-known instrument of Wallace. This alteration makes their application, especially in contracted pelves, or through an imperfectly dilated os, a much easier matter. In place of the very clumsy socket-joint into which the traction-rods are inserted he has substituted the key arrangement, by means of which the handle can be adjusted or removed in a few seconds of time. These improvements do away, to a great extent, with the unhandiness of the older model.

FIG. 3779.—Lusk's Tarnier's Axis-Traction Forceps.



"On the management of breech cases in which both extremities are reflected upward parallel to the anterior surface of the child.—In his now famous article on the forceps, published in 1872, in the "Dictionnaire de médecine et de chirurgie" (1872), Tarnier stated that, under exceptional circumstances, neither Stoltz nor Dubois feared to apply that instrument to the breech, and added that he had several times imitated their practice with success as regarded the mother and sometimes as regarded the child. Where the foetus was dead he made the autopsy with care, and had assured himself that the forceps had produced no lesion, either of the pelvis or of the abdominal viscera. Hüter, in his excellent treatise on "The Obstetrical Operations" (Leipsic, 1874), declares that no better instrument exists for the extraction of the breech than the forceps. Dr. Henry Fruitnight, of this city, published in the July number of the *Virginia Medical Monthly*, 1877, a successful case where the forceps was used at the suggestion of Dr. E. C. Harwood. Dr. I. E. Taylor informs me that he has applied the forceps to the breech six times with success. In the same year Dr. Agnew reported two successful cases to the London Obstetrical Society. In 1877, Haake* published five cases, in which, as he says, to the astonishment of the physicians present, the extraction with the forceps was easily and quickly ended without the slightest detriment to the foetus. Last year I saw, in consultation with Dr. F. A. Castle, a case of breech presentation in a primipara who had passed her thirtieth year. We both of us essayed extraction with the fingers, but in vain. The breech was in the pelvic cavity, but had not yet completed its descent through the cervical orifice. The foetus occupied an oblique diameter, with the back directed to the left and front. In accordance with Haake's suggestion, I applied one blade of Simpson's forceps over the posterior surface of the thigh, and the other over the sacrum, with the extremity of the latter blade just above the crest of the ilium. In spite of the rigidity of the soft parts, the child was extracted alive in about fifteen minutes. The pressure marks of the forceps were considerable. Dr. Harvey, Professor of Midwifery in the Medical College of Bengal, in an essay just received, reports six cases; in three out of six the success was complete, in one the forceps was without avail, while in the other two the instrument did not slip until it had brought down the

breech so as to allow him in one case to get his fingers over the groin, and in the other to apply the fillet, which he had previously failed to do. Dr. W. H. Van Wyck, of this city, reports to me by letter two cases in which, in the years 1865 and 1867, he extracted the children by the breech with the forceps. Both children were born living. Since the invention by Tarnier of *axis-traction* a new impetus has been given to the method advocated.

"With axis-traction not only is the resistance offered by the pelvic canal diminished, but, as Pinard states, the pressure is regulated and is not increased by traction. The foetal portion is therefore seized solidly, and with the least risk of harm. Ollivier reports successes with Tarnier's latest model in his own practice and in that of Budin, Thomas, Berthaut, Lobat, and Cayla. Thus it will be seen that the weight of experience is favorable to the use of forceps as a breech-tractor, while the objections are for the most part theoretical. As regards the rules governing the application of the forceps to the breech, it should be stated that the instrument is inadmissible so long as the breech does not engage in the pelvis. Haake limited its employment to cases in which the breech was already in the pelvic outlet, and after complete rotation had taken place. The history I have related, shows that this rule is not inflexible even with the ordinary forceps.

* Haake, "Ueber den Gebrauch der Kopfzange zur Extraction des Steises." *Archiv. f. Gynaek.* Vol. XI., p. 558.

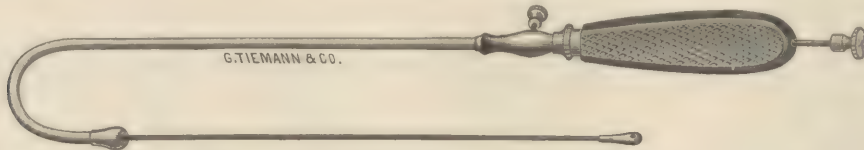
GYNÆCOLOGICAL.

OBSTETRICAL.

Axis-Traction Forceps. (Continued.)

With the axis-traction forceps the indication is certainly extended, as a rule, to all cases where the breech has passed below the pelvic brim, and where the dilatation of the os is well advanced. If rotation has taken place, the blades should be applied over the sacrum and the posterior surface of the thigh, as recommended by Haake. If the hips occupy a transverse diameter, the blades should be applied to the lateral surfaces of the thighs as suggested by Ollivier. The application of the blades over the trochanters, with the extremities overlapping the crests of the ilia, is to be deprecated, as the ilia are compressible and allow the forceps to slip (Ollivier). The extraction of the child should not be made an exhibition of strength. The rigidity of the maternal structures is rarely to be overcome by any justifiable degree of force. The slow descent of the breech, effected by intermittent tractions, insures the physiological softening of the tissues in advance of the presenting part. In this respect the rule is the same as in head presentations. As the genital canal softens and relaxes, but little force is required to effect the birth of the breech. The tractions are most effective if made during the pains. If possible, they should be aided by simultaneous pressure, exerted by an assistant, upon the fundus of the uterus. If these rules are observed, the efforts to extract the breech will, in a large number of cases, I am sure, be crowned with success. If they fail, at least no injury to either mother or child is likely to result from the trial.

FIG. 3780.—The Fillet.



"If the forceps fail, or, owing to the non-engagement of the breech, it is contra-indicated, and an extremity can not be brought down without the employment of force, a resort to the fillet is admissible. The theoretical objections to its use are: 1. That the fillet is apt to become twisted, and that, when moistened with the vaginal secretions, it forms an uneven band, which, even with care, is capable of cutting deeply into the tissues; 2. That in some cases it causes partial extension of the extremity, and, as a consequence, slips forward upon the thigh, whence a fracture of the thigh bone becomes inevitable. The reports from the Lying-in Institution of Munich, where, owing to the advocacy of Hecker, the fillet has been assiduously tested, do not confirm these gloomy prognostications.

"It is hardly necessary to add that, when the fillet is used, it should be passed over the anterior thigh, that only moderate tractions should be employed, that these are most effective when made during the pains, and that very effective aid can be furnished by conjoint pressure upon the opposite pole of the fœtus, exerted during the tractions, by a skilled assistant. The main drawback to the popularization of the fillet is the fact that its passage around the groin by the finger alone is by no means easy in the very class of cases in which it is principally indicated, viz.: those where the breech is high in the pelvis and difficult of access. To be sure, with patience, the knotted end of a handkerchief can sometimes be pushed around the flexure of the thigh, or, failing in this, an elastic catheter with an attached loop may be guided by a finger in the groin between the thighs, to serve as a means of conducting the fillet into position. Because of the difficulties, however, attendant upon both these plans, many porte-fillets have been devised.

"The one I now exhibit (Fig. 3780), which is a modification by Ollivier of an instrument invented by Tarnier for carrying a cord around the neck of a child in neglected shoulder presentations, is an ingenious example. It consists of a long-handled blunt hook, tunnelled in the centre, and terminating in an olive-shaped bulb. The central canal permits the passage of a long piece of whalebone, the extremity of which is furnished with a metallic eye to which a loop can be attached. When the whalebone is withdrawn, the eye occupies the hollow space in the olive-shaped extremity of the blunt hook. Below the handle the end of the whalebone is supplied with a button to prevent it from being accidentally withdrawn into the canal. A screw above the handle serves to fix the whalebone at whatever point is deemed desirable. The blunt hook is adjusted by passing it upward along the surface of the child, directed to the front to a point above the pelvis, and then directing the curve so as to adjust it to the groin. The whalebone is then easily pushed forward until it is felt by the finger of the physician between the thighs of the fœtus. The metallic eye is next directed outside of the vulva by the fingers, and the attached fillet is easily withdrawn by reversing the process described. The fillet employed may be of any material. Every care should be taken to adjust it without forming folds or creases. In emergencies the nearest object has to serve the purpose. Ollivier recommends passing a lacing through a piece of rubber tubing of the size of the little finger. The lacing should be sewed to the extremities of the tube, a projecting portion serving to attach the tube to the eye at the end of the whalebone of the porte-fillet. The rubber tubing, in his experiments, admirably answered the purpose of protecting the tissues of the child from injurious pressure.

GYNÆCOLOGICAL.

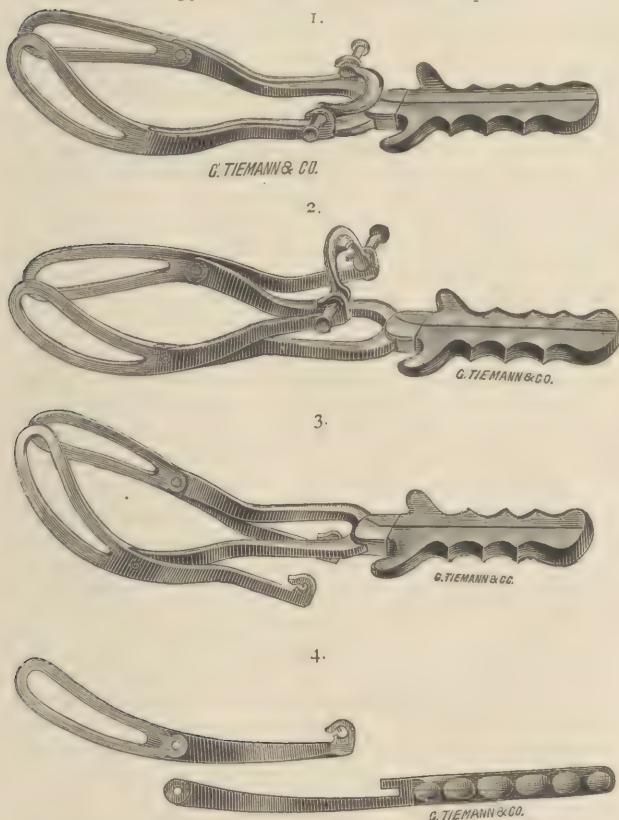
OBSTETRICAL.

Forceps. (Axis-Traction, Continued.)

"In the absence of other appliances, or should failure attend the measures already described, it is well to remember that the blunt hook owes its evil reputation, not so much to its inherent defects, as to lack of proper caution in its employment. It will not break the femur if adjusted in the groin. It will not produce serious contusions if the blunt end is carefully guarded by the finger. Injuries to the maternal organs can only occur where leverage movements are made. The pressure of the curved portion upon the groin is not likely to produce serious lesions. Steady downward tractions, made with moderate force, and with a hand in the vagina to guard the point of the instrument and to give warning of commencing extension of the thigh, will, as a rule, suffice to prevent the occurrence of serious accident.

"Finally, it is proper to state that no instrument is capable of furnishing so secure a hold of the breech as the cephalotribe. If the child is dead, a fact rarely to be determined with positiveness except in cases where the cord can be felt, the cephalotribe should be screwed tightly to the breech, and may be trusted to act as a perfectly reliable tractor."—*New York Medical Journal*, February 14, 1885. William T. Lusk, M. D.

FIG. 3781.—Braun's Tri-form Forceps.



"In Carl Braun's clinic, the forceps generally used is of the Simpson pattern, modified in certain particulars by Braun himself. Under ordinary conditions, this forceps has been found to answer every requirement; but in difficult and high forceps cases accompanied by more or less pelvic deformity, it has often been necessary to terminate labor either by version or craniotomy. For a number of years Braun has been accustomed to resort in the latter class of cases to one or another modification of Tarnier's axis-traction forceps, and with such favorable results that he has himself, by certain alterations, converted the typical Simpson into an axis-tractor, and this forceps he describes in the present paper. Braun has become convinced that through recourse to axis-traction living children may be brought through deformed pelves in cases where, in the absence of an axis-traction instrument, craniotomy would be requisite. Braun's tri-form forceps—as he terms it—is thirty-six centimetres long, the blades being twenty-two centimetres. At the lower angle of each fenestra are perforations where the handles are attached, making a double axis movable joint. The articulation is a perfect one, and the screws at the joints easily removable for cleaning. The hooks at the end of the fenestræ handles are for the insertion of a stirrup-shaped metallic plate which serves to fix the blades. The instrument, when used as in No. 1, is practically an unaltered Simpson, and may be used in typical forceps

cases. Where high forceps are indicated, owing to the movable joints, the pelvic curve of the instrument may be altered from seven to ten centimetres during the adaptation of the instrument, and later, during traction, this curve may be reduced at will. The increase in pelvic curvature of the instrument is gained by (No. 3) linking the fenestræ handles under the lock. (It is sufficiently suggestive from the cuts how the pelvic curve of the instrument may be altered at will by lifting the fenestræ handles above or below the lock.) After use, the instrument may be readily taken apart by the removal of the two screws which articulate the fenestræ to the handles, and carefully cleansed. In Braun's opinion, this instrument will answer on every possible occasion when forceps are indicated."—"C. Braun, On the Manifold Utility of a Tri-form Forceps." *Wien. Med. Woch.*, No. 9, 1886. E. H. G.

GYNÆCOLOGICAL.

OBSTETRICAL.

Modes of Delivery in Obstructed Labor.

"1. *The Forceps*.—From the earliest times in which midwifery was practiced, *accoucheurs* must often have felt the desirability of being able to seize the head of the child between the hands in order to hasten its progress in cases of difficult and tedious parturition. But the human hands are too thick and large to be thus used as the means of seizing and extracting the foetal head when it is arrested in the maternal passages. In order to get over this difficulty we use the forceps—which are in reality nothing else than a pair of iron hands, thinner and slimmer than our own—and thus capable of being pushed past the foetal head so as to embrace and catch it.

"2. *Vectis*.—Another operative procedure, by means of which we may often succeed in effecting a safe and easy delivery in cases where the foetal head is high up in the pelvis, or not yet entered the brim, and when nature is found incompetent to the task, is that known as *podalic version*. * * * What we do in performing this operation of turning, is to interfere with the futile attempt of nature to force the child through a contracted canal in pushing the head first, by turning it; so that the feet are first brought down, and then using these as media by which we may afterwards pull through the partially compressible head of the infant.

"3. *Craniotomy*.—By the use of the forceps, and by means of turning, we can bring children into the world alive that would have inevitably perished had their birth not been hastened by the aid and appliances of art. But there are cases ever and anon occurring where the foetal head is too large, or the maternal passages are too small, or the uterus is too rigidly contracted to admit of the delivery of the child alive without bringing the life of the mother into the most imminent danger. In such instances we can still save the mother's life by sacrificing that of her progeny. For by opening the head of the infant by means of perforating instruments, we can remove the contents of the cranium, and then break down the vault of the skull itself, and bring away the fragments piecemeal, until only the base of the cranium and the bones of the face remain to be extracted by means of crotchets and other instruments. This frightful operation has been recommended and had recourse to alike in cases where the child was living and where it was dead.

"4. *Cephalotripsy*.—About a quarter of a century ago, an instrument was invented by the younger Baudeloque, which was intended to supersede all those instruments by means of which craniotomy is performed. This formidable instrument is called the cephalotribe, and is used for crushing and diminishing, not the presenting portion of the head only, but all the bones of the head and face as well. At first, this instrument was used alone for all the purposes of diminution and extraction; but now a preliminary perforation of the head, as in the ordinary operation for craniotomy, is always, I believe, first effected."—"Works of Sir James Y. Simpson." Vol. III.

"*Cranioclast*.—This is substantially a powerful pair of craniotomy forceps. The larger blade, which is intended to be placed upon the outer surface of the head, is fenestrated and grooved. The smaller one, for introduction into the perforated skull, is solid and supplied with ridges which fit into the grooves upon the opposite blade. The two blades articulate by means of a button lock. By a twisting movement, the cranioclast, when applied, can be employed to wrench off the bones of the calvarium, different portions of the skull being seized successively with the view of accomplishing that result. * * * The cranioclast enables us to extend the limits of safe delivery far beyond what would be admissible with the cephalotribe, as with its aid it is possible, after the complete or partial removal of the flat bones of the skull, to tilt the chin downward, and draw the base by the edge through the conjugate.

"*The Crotchet* is a steel hook with a sharp-pointed extremity. In craniotomy the instrument is often useful in breaking up the brain. It may be inserted into an orbit when it is desired to bring the base of the skull end on into the pelvis. In default of either cranioclast or cephalotribe, it may be employed to extract the perforated head.

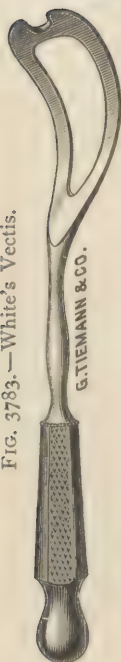
"*The Blunt Hook*, though not indispensable, is capable of rendering valuable service in delivering the head after the performance of craniotomy. * * * In difficult cases, delivery of the trunk is sometimes favored by tractions made by a blunt hook inserted under the posterior shoulder.

"*Embryotomy*.—In a literal sense, embryotomy includes all the graver operations designed to diminish the volume and resistance of the foetus. Custom has, however, restricted the term to those operations only which are performed upon the trunk of the child. It is used, therefore, as a rule, in

FIG. 3782.—Simpson's Forceps.



FIG. 3783.—White's Vectis.



GYNÆCOLOGICAL.

OBSTETRICAL.

Modes of Delivery in Obstructed Labor. (Continued.)

contra-distinction to craniotomy, and not in its generic sense. * * * Embryotomy includes two operative measures, viz. : exenteration and decapitation."—"The Science and Art of Midwifery." Lusk.

"5. *Cesarean and Sigaultian Operations.*—Where no amount of diminution in the size of the infant would suffice for the extraction of it with safety to the mother, *accoucheurs* sometimes—but fortunately very, very rarely—try to save the infant's life by having recourse to one or other of these two operations, by which, however, the mother's life is almost inevitably sacrificed. We may either make an incision into the abdominal and uterine walls, and bring the child out through that opening; or we may divide the pelvis at the symphysis pubis, and, by separating the two sides of the bony pelvis in this way in front, we may produce a dilatation of the passages sufficient to allow of the transit of the child. A mighty improvement on all of these form of operation is—

"6. *The Induction of Premature Labor.*—By bringing on labor at a period in ptero-gestation when the child is still small enough in construction to pass safely through a contracted pelvis, although sufficiently developed to be able to maintain an independent extra-uterine existence, we can obviate nearly all the risks to which both mother and child are exposed in all of the operative procedures of which I have been speaking. This operation, which represents, perhaps, the greatest improvement that has ever been made in the practice of midwifery, was first suggested and performed in England about the middle of the last century; and, when we know beforehand of the existence of some degree of deformity of the pelvis likely to impede the birth of a full-grown foetus, there is no safer, or speedier, or more satisfactory way of solving the problem as to how the dangers of delivery in such a case are to be avoided, than by bringing on labor four, six or eight weeks before the normal period of parturition, by simply separating, to some extent, the decidual membranes from the interior of the body of the uterus."—"Works of Sir James Y. Simpson." Vol. III.

PLACENTA PRÆVIA.

Uterine Dilators.

"*Placenta Previa* (*præ*, "before," and *via*, "way"), *P. obvia* seu *oblata*. Presentation of the placenta; a condition which gives rise to *unavoidable hæmorrhage* from the uterus. The safety of the female depends upon speedy delivery."—DUNGLISON.

BARNES' DILATORS (see Fig. 3605).—"These bags are inserted into the cervix uteri by means of a sound introduced into the little pouch, situated on the outside of the bag. The instrument is expanded by injecting water into it by means of a Davidson's syringe."

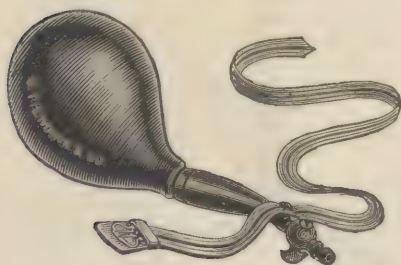
MCLEAN'S-BARNES' DILATOR (see Fig. 3606).—"The usual fiddle-shaped bags (Barnes') are inserted by means of a sound introduced into the little pouch, which is situated, necessarily, at an awkward point on the surface of the bag. This pouch, besides being liable to be punched through in a somewhat dangerous manner, in the attempt at introduction, is a convenient receptacle for septic matter. * * * My instrument is a duplication of the bag and tube, so that one side may be distended independently of the other, thus requiring but one insertion to get a very extensive dilatation. These bags are made as smooth as possible, have no extra pouch, and are easily and quickly inserted by means of a pair of somewhat curved forceps, and are held *in situ* until sufficiently distended to retain themselves within the grasp of the cervix."

MCLEAN'S FORCEPS FOR INTRODUCTION OF THE DILATOR (see Fig. 3597).—"In placenta prævia, time is exceedingly valuable, and this instrument renders the operation more valuable by being *promptly* accomplished. I have generally found one size all that is required in dilating the cervix, so that *one* insertion has sufficed to complete the necessary expansion. They are easily cleaned, strongly made, and there need be but two sizes used. I have

found them also very valuable in the induction of labor for eclampsia, and I know of no other means which will accomplish delivery so safely and quickly. The largest size I have found useful as a vaginal dilator or colpeurynter. For expanding this instrument, I always use carbolized hot water. The pressure made by it is very powerful, and they should be slowly injected; one side being fully distended first, and, as soon as the grasp of the cervix begins to relax, the other tube is attached to the syringe and very slowly filled. In this manner *continuous dilatation with complete occlusion of the bleeding os* is accomplished, giving us most valuable aid in the management of placenta prævia."—*American Journal of Obstetrics*. March, 1886.

For dilatation of the os uteri and upper part of the vagina, see also UTERINE DILATORS, page 504.

FIG. 3784.—Braun's Colpeurynter.



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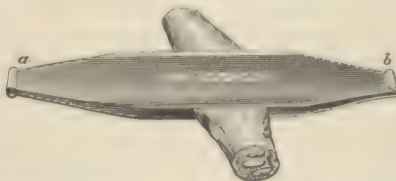
OBSTETRICAL.

Vectes, Levers, Cord Carrier, Insufflators and Placenta and Embryotomy Forceps.

FIG. 3785.—Wenck's Amniontome, for rupturing the membrane during childbirth.



FIG. 3786.—Pulling's Funis Clamp.



Pulling's funis clamp is made of a single strip of thin steel doubled on itself, by which pressure on the cord may be rendered constant under all circumstances for preventing hæmorrhage.

FIG. 3787.—Vectis.

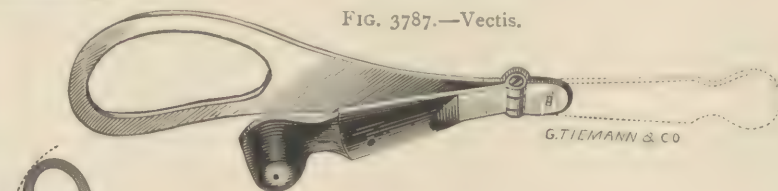


FIG. 3788.—Ryerson's Adjustable Vectis.

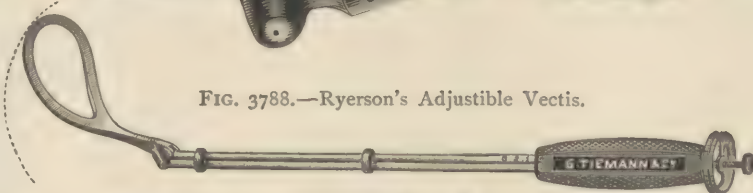


FIG. 3789.—Scholler's Cord Carrier, for holding or changing the position of the umbilical cord.

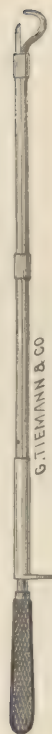


FIG. 3790.—Dewey's Hook and Carey's Lever.

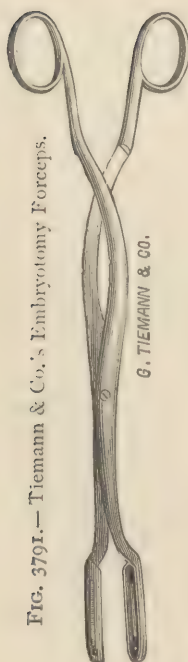
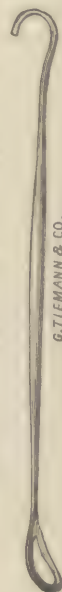


FIG. 3791.—Tiemann & Co.'s Embryotomy Forceps.

G. TIEMANN & CO.

FIG. 3792.—Lusk's Insufflator, made of an English elastic catheter, fitted to a soft rubber air-bag.

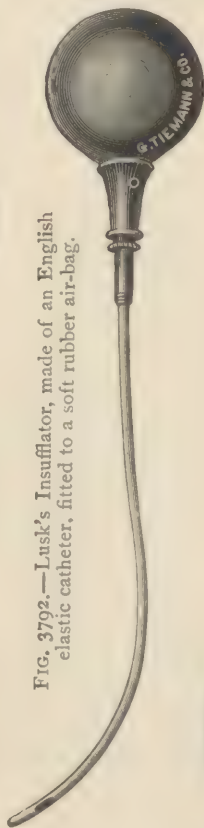
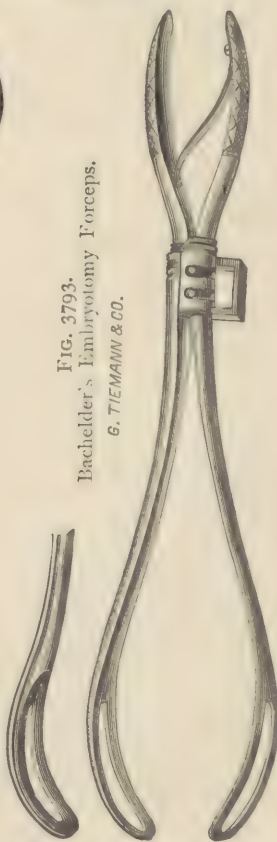
FIG. 3793.
Bachelder's Embryotomy Forceps.
G. TIEMANN & CO.

FIG. 3794.—Robinson's Insufflator, for the lungs of infants who are born in a state of semi-asphyxia, after prolonged or difficult labor.

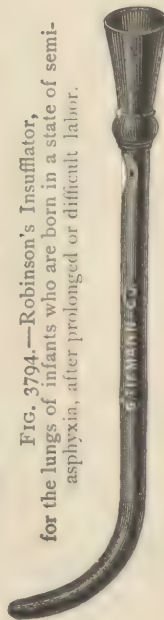
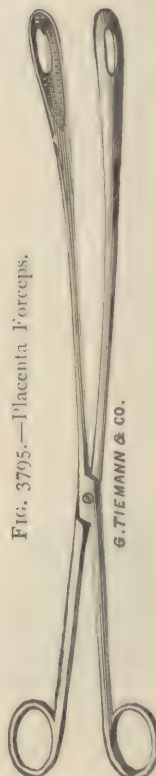


FIG. 3795.—Placenta Forceps.



G. TIEMANN & CO.

GYNÆCOLOGICAL.

OBSTETRICAL.

Craniotomy and Embryotomy.

FIG. 3796.—Batchelder's Perforator.

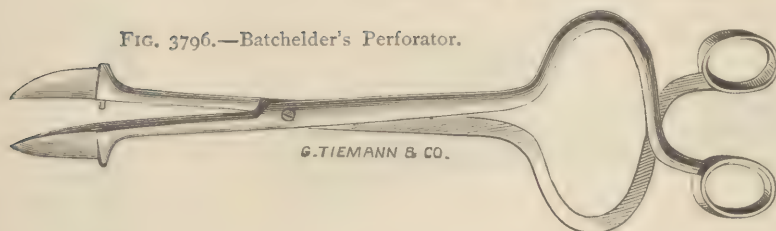


FIG. 3797.—Nægeli's Perforator.



FIG. 3798.—Holme's Perforator.



FIG. 3799.—White's Perforator.



FIG. 3800.—Simpson's Perforator.

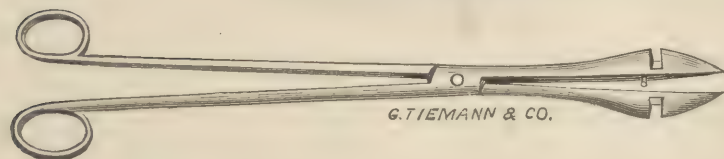


FIG. 3801.—Thomas' Perforator.

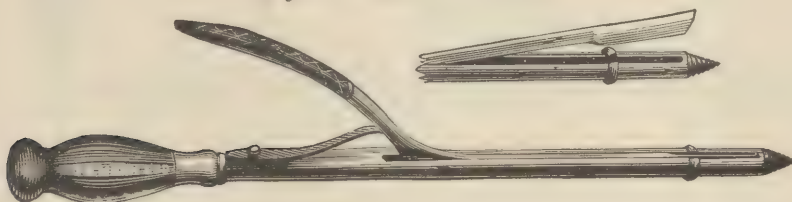


FIG. 3802.—Bedford's Perforator.

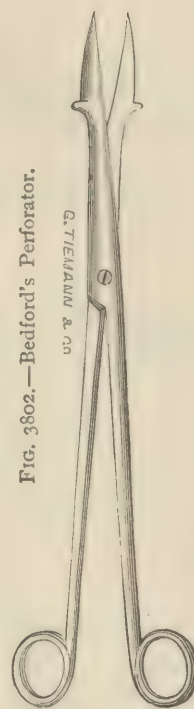
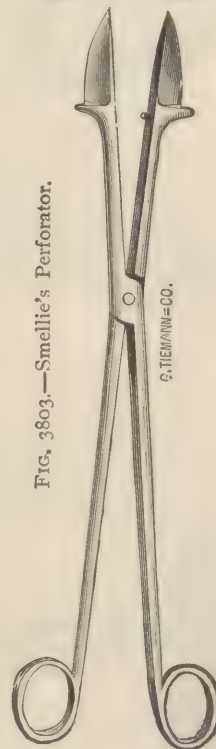


FIG. 3803.—Smellie's Perforator.



GYNÆCOLOGICAL.

OBSTETRICAL.

Craniotomy and Embryotomy.

FIG. 3804.—Blot's Perforator.

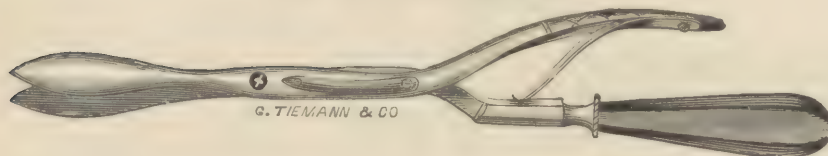


FIG. 3805.—Blunt Hook and Crotchet.

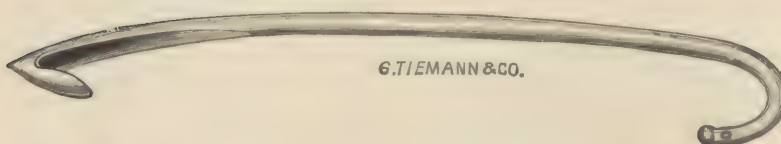


FIG. 3806.—Taylor's Blunt Hook.



FIG. 3807.—Guarded Blunt Hook and Crotchet.

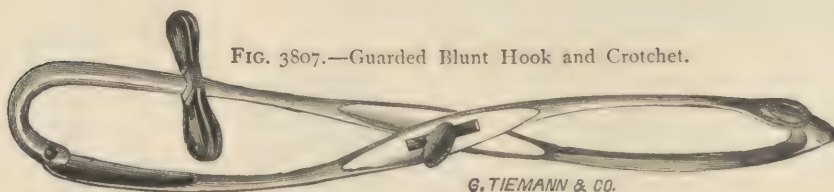


FIG. 3808.—Bedford's Guarded Blunt Hook and Crotchet.



FIG. 3809.—Decapitating Hook.

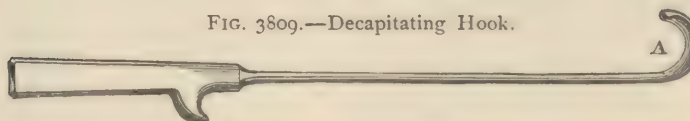


FIG. 3810.—Braun's Decapitating Hook.

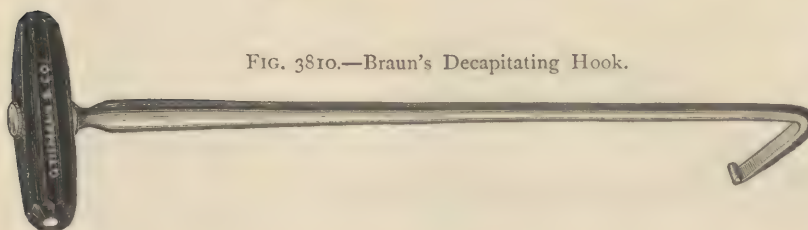


FIG. 3811.—Truheart's Trephine Perforator.

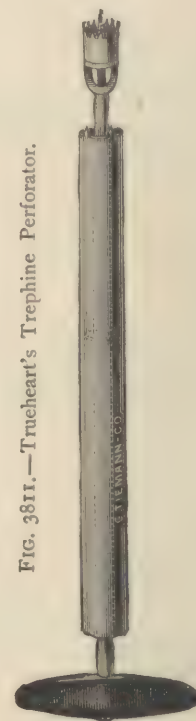
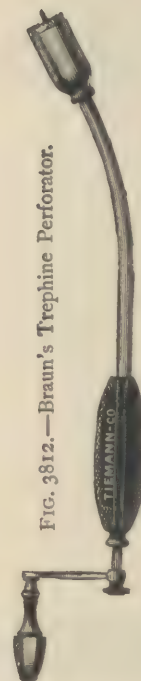


FIG. 3812.—Braun's Trephine Perforator.



GYNÆCOLOGICAL.

OBSTETRICAL.

Craniotomy and Embryotomy.

FIG. 3813.
Tarnier's Basiotribe.



FIG. 3814.—Thomas' Craniotomy Forceps.

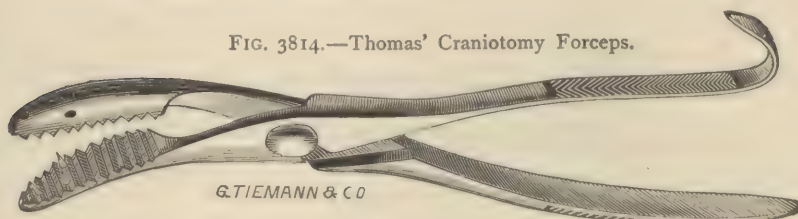


FIG. 3815.—Meigs' Craniotomy Forceps, straight.



FIG. 3816.—Meigs' Craniotomy Forceps, angular.

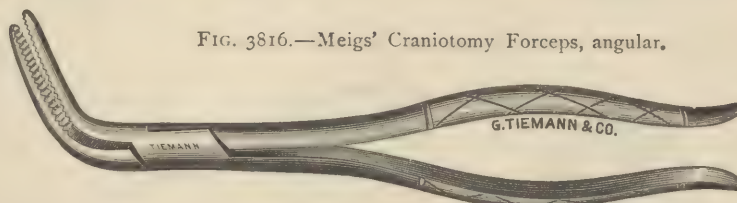


FIG. 3817.—Meigs' Craniotomy Forceps.

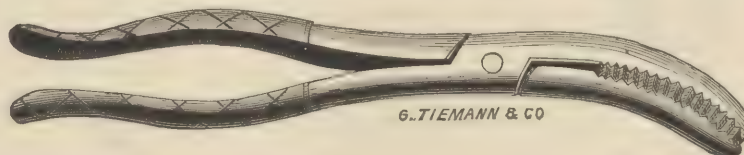
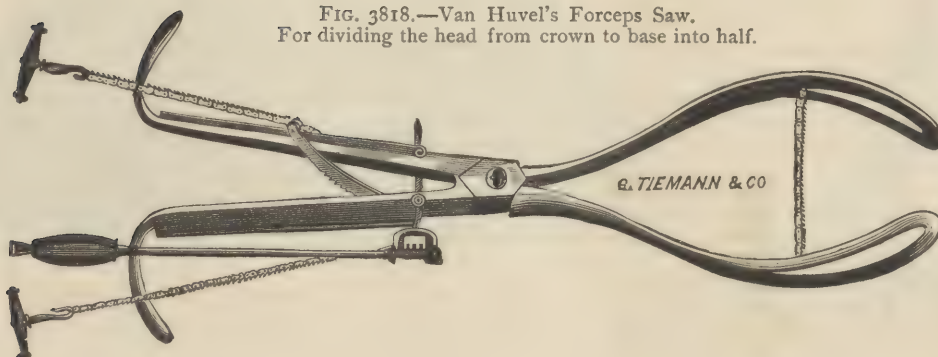


FIG. 3818.—Van Huvel's Forceps Saw.
For dividing the head from crown to base into half.



GYNÆCOLOGICAL.

OBSTETRICAL.

Craniotomy and Embryotomy

FIG. 3819.—Simpson's Cranioclast.

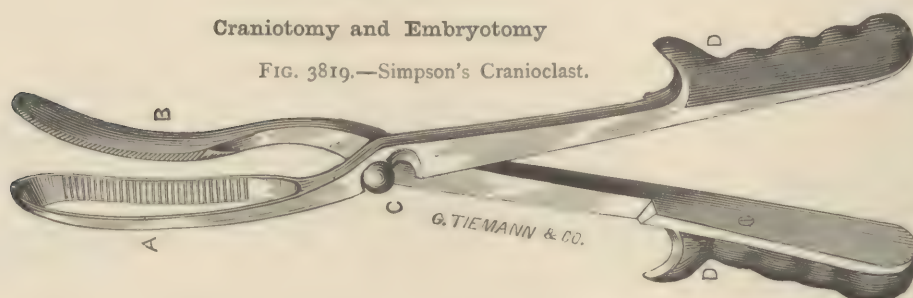


FIG. 3820.—Braun's Cephalotribe.

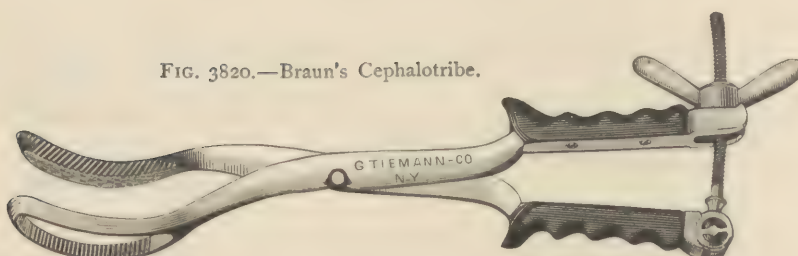


FIG. 3821.
Simpson's Cephalotribe.



FIG. 3822.—Lusk's Cephalotribe.



Bags for Obstetrical Instruments.

FIG. 3823.—Obstetrical Bag.



We also make Leather "Roll-up" Pouches to hold Obstetrical Instruments, and also fit instruments accurately and compactly into Russia Leather or Patent Leather velvet-lined Cases.

GYNÆCOLOGICAL.

OBSTETRICAL.

Sets.

Bedford's Set of Obstetrical Instruments.

\$28.

- 1 pair of Bedford's Forceps
- 1 Bedford's Perforator.
- 1 pair of Placenta Forceps.
- 1 Blunt Hook and Crotchet, combined.
- 1 Leather Pouch, lined with oil-dyed velvet.

Budd's Set of Obstetrical Instruments.

\$40.

- 1 pair of Budd's Forceps.
- 1 Blunt Hook and Crotchet.
- 1 Perforator.
- 1 pair of Placenta Forceps.
- 1 pair of Craniotomy Forceps.
- 1 pair of Simpson's Short Forceps.
- 1 Patent-Leather Case, neatly arranged and lined with oil-dyed velvet.

Brickell's Set of Obstetrical Instruments.

\$48.

- 1 pair of Brickell's Long Forceps.
- 1 pair of Brickell's Short Forceps.
- 1 pair of Straight Craniotomy Forceps.
- 1 Perforator.
- 1 Vectis.
- 1 Guarded Blunt Hook.
- 1 Guarded Crotchet.
- 1 Leather Pouch, lined with oil-dyed velvet. All the instruments nickel-plated.

Elliott's Set of Obstetrical Instruments.

\$35.

- 1 pair of Elliott's Forceps.
- 1 Ebony-Handled Blunt Hook.
- 1 Ebony-Handled Crotchet.
- 1 Blot's Perforator.
- 1 pair of Plain Placenta Forceps.
- 1 pair of Ramsbotham's Craniotomy Forceps.
- 1 Roll-up Pouch, lined with oil-dyed velvet.

Hodge's Set of Obstetrical Instruments.

\$16.

- 1 pair of Hodge's Forceps.
- 1 Blunt Hook and Crotchet, combined.
- 1 Bedford's Perforator.
- 1 Leather Pouch, lined with oil-dyed velvet.

Thomas' Set of Obstetrical Instruments.

\$66.

- 1 pair of Elliott's Forceps, rather heavy.
- 1 pair of Davies' Short Forceps.
- 1 Trephine, for Perforating.
- 1 Blunt Hook and Crotchet.
- 1 Simpson's Cranioclast.
- 1 Cephalotrite.
- 1 Gum Elastic Catheter.
- 1 8 oz. Phial for Chloroform.
- 1 Case, patent leather.

Taylor's Set of Obstetrical Instruments.

\$28.

- 1 pair of Taylor's Forceps.
- 1 Smalley's Perforator.
- 1 pair of Craniotomy Forceps.
- 1 pair of Placenta Forceps.
- 1 Blunt Hook and Crotchet combined.
- 1 Leather Pouch, lined with oil-dyed velvet.

G. Tiemann & Co.'s Aseptic Obstetrical Case.

\$72.

- 1 Braun's-Munde's Cephalotribe.
 - 1 Blunt Hook.
 - 1 Vectis.
 - 1 Jewett's Obstetrical Forceps.
 - 1 Simpson's Obstetrical Forceps, short.
 - 1 Placenta Forceps, double crossing.
 - 1 Blot's Perforator.
 - 1 Cary's Hook and Lever.
 - 2 Bottles.
 - 1 Case, russet leather, velvet lined.
- All handles are of hard rubber and "baked on."

TRACHELORRHAPHY, HYSTERO-TRACHELORRHAPHY.

Repair of Lacerations of the Cervix Uteri.

"In reviewing the field of practice, I have not found it possible to discover any natural line of division between obstetrics and gynæcology. No man merits the reputation of a good accoucheur unless he possesses a thorough appreciation, not only of the immediate dangers, but of the far-reaching consequences of the faulty practice of his art; nor can his equipment be looked upon as otherwise than defective unless it include an ability to repair surgical injuries at the time of occurrence."—"The Science and Art of Midwifery." Lusk. 1882.

Emmet's Operation.—"Lacerations through the neck of the uterus are of more frequent occurrence than has been supposed. In fact, I doubt if a woman can give birth to her child without some laceration taking place; but the rule is that it should heal rapidly and cause no difficulty afterwards. Even most extensive tears are seldom recognized at the time of labor. The tissues are then so soft that, unless the rent has passed beyond the cervix into the vagina and

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Repair of Lacerations of the Cervix Uteri.

connective tissue, it can scarcely be detected by a mere digital examination. Indeed, the occurrence of the accident, in all probability, will not even be suspected at the time, unless an unusual amount of hæmorrhage should take place."

"After labor, the whole organ being in a state of fatty degeneration, and the tissues of the neck soft, these flaps, in a double laceration, flatten against the posterior wall of the vagina, or floor of the pelvis, so that all appearance of laceration becomes lost. So perfect is the deception, that it is frequently impossible for any one not familiar with the condition to recognize the existence of a laceration by an ocular examination alone."

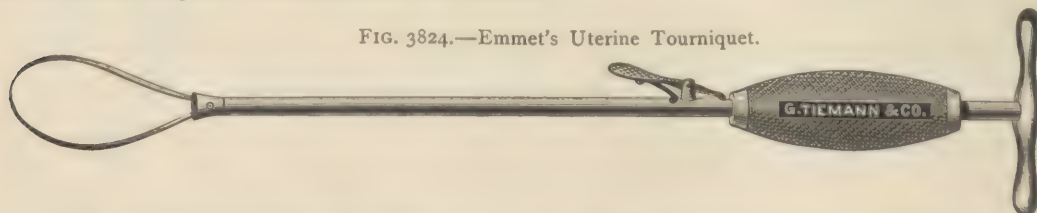
"Dr. W. S. Playfair states,* in regard to this difficulty: 'It is, perhaps, somewhat humiliating for us to admit that we have all been misunderstanding these cases, and it is not very easy to convince sceptics of the fact, who have not accustomed themselves to the only method of examination by which it can be appreciated. So long as we use the ordinary cylindrical speculum only, its extremity impinges upon the everted lips of the lacerated cervix, which are turned and rolled outwards, like the head of a piece of celery, and give the impression of an ulcerated surface.' If, however, we use a duck-bill speculum and a pair of tenacula we can, with the greatest ease, approximate the surfaces of the torn cervix, and at once the apparent abrasion disappears and the cervix seems for the moment to be of its usual shape and of an unbroken surface.' In my experience, the same difficulty exists when any other form of speculum is used, with this single exception: Sims' speculum is the only instrument in use which will leave the parts unchanged in position. My mode of examination is to place the patient on the back, and, by means of the index-finger, the true position can be readily appreciated."

Mode of Operating for Closure of a Lacerated Cervix.

"The usual mode of operating is to place the patient on the left side, and to use Sims' speculum, or some other perineal retractor, to bring the parts into view. The operation can sometimes be performed with the patient on the back, when the vaginal outlet is large, since the uterus is then so low that it can be readily drawn outside and returned after the operation. But the left side has this advantage, that, while the patient is in this position, there will be less rolling out of the tissues than in any other, except in the knee-elbow-position.

"When the uterine tourniquet is to be used, the first step is to bring the flaps together in apposition, and, while they are lifted up by means of a double tenaculum in the hands of an assistant, the instrument is to be slipped over the cervix below the point of vaginal junction, and tightened."

FIG. 3824.—Emmet's Uterine Tourniquet.



"Its use is to control the hæmorrhage during the operation, as it is sometimes excessive. The uterine tourniquet has a portion of a watch-spring passed through a canula, and in the handle is the double ratchet of the *écraseur* to tighten the loop about the cervix. Just before constricting the neck, I take the precaution to draw up with a tenaculum, through the loop, sufficient vaginal tissue all around the cervix to enable the flaps to be brought together easily. The fold thus formed renders the instrument less likely to slip over the cervix, when it has become reduced in size from the escape of blood during the operation.

"Until recently I regarded this uterine tourniquet as essential in every operation for closing a lacerated cervix. I now confine its use entirely to operations where the tissues of the cervix are unusually soft, since I have learned from experience that the loss of blood is likely, in such cases, to be very great. But, under ordinary circumstances, I have found that the administration of a large hot-water vaginal injection, just before the operation, will so far lessen the bleeding that the tourniquet can be dispensed with. * * *

"At the beginning of the operation it is always necessary to open out the flaps, so as to expose fully the lacerated surfaces which are to be denuded. The surface is to be removed from one lip to the other, leaving a broad undenuded tract in the centre, from before backward, which is to form the continuation of the uterine canal to the os. The undenuded portion on each flap is made to correspond with that on the opposite side, and should widen gradually from the outer end of the uterine canal towards the limit of the laceration. Therefore, when the flaps are brought together, the new canal through the cervix will be trumpet-shaped. As the uterus gradually returns to the normal size, the new canal will become of natural and uniform diameter throughout. To make this canal of a proper size, we must be guided by the amount of hypertrophy in the flaps. It must bear some relation to the increased size of the flaps, and

* "Notes on Trachelorrhaphy, or Emmet's Operation."—"Transactions of the Obstetrical Society of London," 1883.

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TRACHELORRHAPHY, HYSTERO-TRACHELORRHAPHY.

Repair of Lacerations of the Cervix Uteri. (Continued.)

the trumpet-shape is necessary, since the hypertrophy increases in degree from the bottom of the laceration towards the outer edge of the flap. * * *

"Either the scissors or the scalpel may be used to freshen the surfaces, but I prefer the scissors, for the greater rapidity with which the tissues can be removed with them. It is necessary, when freshening the surfaces, to remove very superficially the tissues near the outer angles of the fissure, just at the vaginal junction, unless the laceration should have been a very extensive one. The circular artery, owing to its elasticity and its position in loose connective tissue, is seldom ruptured when a laceration of ordinary extent takes place. But, as the parts contract after cicatrization, it is frequently left just at the termination of the angle of the fissure with the vaginal tissues. When the tissues are dense, I sometimes have to use a scalpel to denude the angle at the bottom of the laceration, when confined to one side. We frequently meet with cases where nature has attempted to repair the injury and to prevent the gaping of the flaps, in a double laceration, by filling in the angle on each side by granulations as the parts have healed. The result is that a dense cicatricial plug remains. When this condition exists, there is often much reflex disturbance of the nervous system, and frequently it is the exciting cause of neuralgia in other parts of the body. It is important to draw particular attention to this cicatricial tissue, that not only its existence may be recognized, but the necessity for its removal fully appreciated. The presence of a cicatricial cord across the cervix may give rise to as much disturbance as the original difficulty.

"The cervix is sometimes lacerated in a bifid form, or in three, and even four, sections. Were we to denude in each cleft, and then attempt to bring these flaps together, the result would be, in all probability, a failure—since the traction in opposite directions would cause the sutures to cut out.

"One or more of these flaps is usually hypertrophied and much out of proportion to the rest, so that it would be difficult to approximate the surfaces properly without removing a small segment by a V shaped incision, when the freshened surfaces may be brought together. When lacerated into four sections, I have removed on each side a segment, and then brought the remaining flaps together as in a double laceration. With a knowledge of this principle, it will require but little study of any individual case to realize almost at a glance the proper course to pursue.

"When it is safe to do so, the process of freshening the surfaces is very much facilitated by drawing the uterus gently down towards the vaginal outlet, and then having the organ steadied by a strong tenaculum in the hands of an assistant. The nearest portion, or that which is the lowest, should be removed first, since, by doing so, the view is less obstructed by blood running over the surface. The portion to be removed is to be hooked up with a small tenaculum, and the strip kept on the stretch while it is being separated, and, if possible, it should be removed by a single piece from the side of one flap to the other. This is the best plan to insure the denudation of the whole surface, when the oozing of blood is at all free. With the use of either the knife or scissors, the freshened surfaces should be made as smooth as possible, and uniform in extent. The best results are obtained when we get union by first intention; but, to gain this, it is necessary that the parts should be approximated with some degree of accuracy, for a projecting edge, left to heal by granulation, cicatrizes, and afterwards contracts. The presence of a cicatricial cord across the cervix may give rise to as much disturbance as the original difficulty.

"When the injury has been of long standing, and the tissues have become dense, the chief difficulty in the operation is experienced in passing the needles. The short round needle, which I was the first to use for operations about the vagina, has the advantage of making only a punctured wound, and, when the suture which it carries is introduced, it so fully occupies the tract that there is little danger of oozing of blood, as after the use of the needle with a cutting edge. But, the more dense and indurated the tissue, the less vascular will be the parts. Under these circumstances, the lance-pointed needle, being easier of introduction, answers best for the purpose; but, if the tissues are soft, the round needle should be used. Four sutures or more are required for each side, if the laceration is extensive or double."—*"Principles and Practice of Gynecology."* Emmet.

Skene's Method.—"The treatment consists in reuniting the divided parts by trachelorrhaphy. Preparatory treatment is necessary when the tissues of the cervix are abnormal. Cysts, if any exist, should be freely laid open. Hyperæmia should be relieved by the free use of hot water injections and applications of iodine. The uterus should be held in position by a pessary or tampon, if there is any displacement requiring such treatment.

"In restoring the cervix I greatly prefer to operate without anæsthetizing the patient. In the record of my last sixty-five cases I find that ether was used in two, and nitrous oxide gas in one. The pain of the operation is trivial compared with the suffering from the after effects of an anæsthetic, and the chances of a good result are increased by avoiding the disturbance of the sutures caused by the vomiting which so frequently follows the use of ether or chloroform.

"The operation is performed as follows: The patient is placed upon the left side, and a Sims' speculum introduced and held by a trained nurse or assistant. A tenaculum forceps, curved upon the side (Fig. 3825), is fixed in the

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TRACHELORRHAPHY, HYSTERO-TRACHELORRHAPHY.

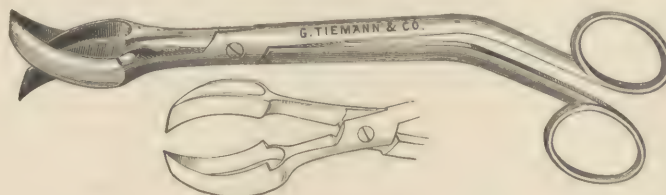
Repair of Lacerations of the Cervix Uteri. (Continued.)

FIG. 3825.—Skene's Tenaculum Forceps.



anterior half of the cervix, at a point which makes the lip of the os externum. The posterior half of the cervix is seized in the same way with a similar forceps, and the operator, taking a forceps in each hand, brings the two flaps together, in order to see exactly where the parts are to be united. The forceps which holds the anterior flap is then given to an assistant, while the one attached to the posterior flap is held in the left hand of the operator, and the surfaces are denuded by the hawk-bill scissors (Fig. 3826). The parts of the scissors are made to seize the angle formed by

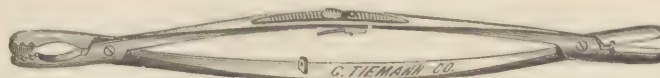
FIG. 3826.—Skene's Hawk-bill Scissors.



the junction of the two flaps as far as appears necessary. The flaps are brought together by the aid of the forceps on each side, so as to bring the tissues more within the grasp of the scissors. The blades of the scissors are then closed, and a strip is removed from above downwards on each flap. It frequently happens that a portion of the tissue to be so removed escapes from the scissors at the lower portion of the flaps, on one or both sides; but that can be easily trimmed off with curved scissors. The most difficult part of the denudation is at the angle formed at the juncture of the flaps, if the curved scissors are used; but with the hawk-bill scissors that portion of the denudation can be accomplished accurately and with facility. Silver wire sutures are generally used, but I prefer silk. It is much more easily handled, and, when properly prepared, is as innocuous to the tissue as the metallic suture.

"Braided silk (No. 7) is prepared by being immersed for several hours in melted beeswax mixed with five per cent. each of carbolic and salicylic acid. When thoroughly saturated, the silk is passed through a hole in a piece of cardboard, or the eye of a needle, to remove the excess of wax. The needles used are triangular, pointed and about three-quarters of an inch long. The needle-forceps which I employ is made to obviate two difficulties. First, the tendency of the needle to slip when passing the suture on a curve, and, secondly, the danger of spoiling the point of the needle in withdrawing it. It is a double forceps composed of two halves, the central portions of which are made of elastic steel, which forms the handle. These halves cross at each end and terminate in the jaws of the forceps. At one end there are three grooves in the jaws, admitting the needle, and holding it at either an acute, obtuse, or right angle, whichever the operator may require. The other end of the forceps has jaws faced with soft copper. This is used to grasp the point of the needle in drawing it through. Fig. 3827 will give a correct idea of the mechanism of this instrument.

FIG. 3827.—Skene's Needle Forceps.



"The needle is placed in the groove which will give the desired angle, and is held immovable there, when the operator grasps the handle and closes the catch. The needle is then passed into the tissue and left there while the forceps is unclamped and withdrawn; its other end is then applied, to grasp the point of the needle in drawing it through. The sutures are tied as follows: One or two turns of the ends are made to form the first half of the knot; the assistant takes hold of one end, the other is passed through the loop of a counter-pressure tenaculum (Fig. 3828) and then seized by the

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TRACHELORRHAPHY, HYSTERO-TRACHELORRHAPHY.

Repair of Lacerations of the Cervix Uteri. (Continued.)

FIG. 3828.—Skene's Counterpressor.

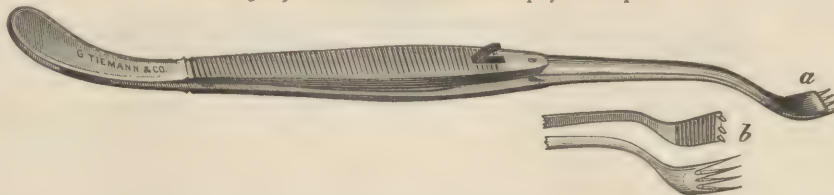


left hand of the operator. Traction is then made on both ends of the suture, and, at the same time, the loop of the instrument is pushed down along the thread to make the knot slip to its destination. Repeating this manœuvre, completes the knot. By this method the sutures can be tied about as easily and rapidly in the cavity in the vagina as upon a free surface, &c., &c."—"Holmes' Surgery," Vol. II. 1881. Alexander J. C. Skene, M. D.

Other Instruments for Repair of Lacerations of the Cervix Uteri.

"The difficulty of clearing out the angles nicely between the flaps in lacerations of the cervix, so as to bring the planes of incision to their true line of intersection, is a well-recognized one; and no apology to the profession is necessary for inflicting upon its consideration a new instrument in the shape of a tissue-forceps. Everyone who has had to operate upon irregularly shaped, unsymmetrical lacerations, filled with tough cicatricial tissue, has experienced the difficulty of locating and controlling, with a proper degree of precision and ease the lines of incision with the instruments used for cutting, whether they were the curved scissors or scalpel. I have, therefore, had Messrs. George Tiemann & Co. construct for my use the tissue-seizing forceps illustrated by the accompanying drawing.

FIG. 3829.—Cowan's Trachelorrhaphy Forceps.



"The blades are designed to transfix and then clamp firmly small areas and layers of tissue between their grasp, and at the same time to serve as a mechanical guide which limits and directs the scalpel or scissors in any given direction of dissection. They nest or *spoon together* like a pair of silver forks; one of them having small sharp tines or prongs like those of a common eating fork, while its companion presents a flat surface to its fellow, and is armed with short, sharp, and very small teeth, which interdigitate with the tines or prongs. The method of using it is as follows: the tined blade is first thrust in underneath the tissue to be removed, when the clamping blade is pressed down upon it, and its hold secured by a catch spring and the small teeth, which bury themselves in the tissues.

"A scalpel or curved scissors now is made to cut along under the surface of the tined blade, freeing the instrument from its position where it has been imbedded in the tissues, and leaving the separated tissue adhering by one end. Underneath this detached portion the pronged blade can be reinserted as often as is necessary, and the whole finally taken off in one continuous layer; or the whole piece may be left at the point of intersection of the opposite side, to be removed by uniting the two planes of dissection at the proper centre. The tissue may in this way be so removed as to make any angle at the pleasure of the operator, and clear of all tugs and shreddy bits of tissue which the bistoury or scissors often leave behind."—Geo. Gowan, M. D., Danville, Ky. *Medical Record*, August 1st, 1885.

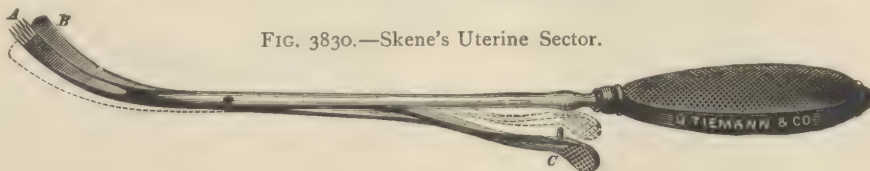


FIG. 3830.—Skene's Uterine Sector.

"The uterine sector, as my friends the instrument makers, George Tiemann & Co., call it, is an instrument which I devised for vivifying the tissues in the operation for the restoration of the cervix uteri after laceration. The handle and stem is about the shape and size of a uterine sound, only a little shorter in all. At the distal end it is flat and about five-sixteenths of an inch broad, and terminates in a number of needle-points, as seen at *A*, in the figure. To the under side of the needle-pointed stem is attached a blade, which is lance-pointed and fits closely under the curved portion. The point of this is seen at *B*. The end of this blade nearest to the handle is held out from the stem by a spring at *C*. The two portions are held together by a scissors joint.

GYNÆCOLOGICAL.

TRACHELORRHAPHY, HYSTERO-TRACHELORRHAPHY.

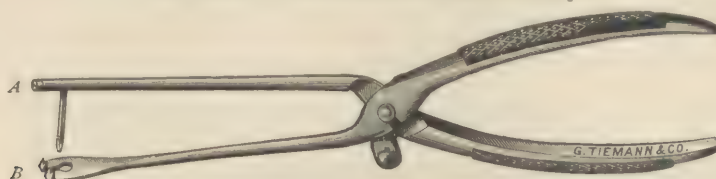
Repair of Lacerations of the Cervix Uteri. (Continued.)

"The instrument is used as follows: holding it by the handle, the needle-points are pushed into the tissues of the surface to be pared, and, by pressing in the cutting-blade at *C*, the lance-point is made to slip to and fro under the middle point and divide the tissues. By pressing the point of the instrument forward, and at the same time alternately pressing and relaxing at the end of the cutting blade, a strip of a surface can be shaved off with facility.

"This instrument is not designed to take the place of the scissors or knife, but is intended as an assistant. For paring the edges of the divided cervix, when the tissues are so hard as to elude the knife or scissors, this sector is quite valuable. In paring the upper angle of a fissure of the cervix that runs up about the vaginal juncture, I have used it with more facility than I could the scissors or knife."—Alexander J. C. Skene, M. D., Brooklyn, N. Y., May, 1879.

Van de Warker's Method.—"As my operation for the repair of the cervical rent is partly peculiar to myself, I think it proper to give a few words to the subject. The instrument that I use was figured and described in the *Medical Record*, of New York, January 22d, 1880. It was designed to popularize the operation, but, owing to a misunderstanding of the method of using it, such has not been the result. To correct this, I again figure the instrument (and the manner of using it).

FIG. 3831.—Van de Warker's Needle Forceps.



"Fig. 3831, *A*, represents what I term the male blade. This has two buttons to receive the slot of the female blade, *B*, after the style of a lock of an obstetric forceps. The middle one (see Fig. 3831) for entering the needle, the lower one on the arm projecting downwards, is used to receive the slot of the female blade in withdrawing the needle.

"In preparing the parts, I observe but one rule. I first freshen the opposing surfaces that I wish to unite, and then carry my scissors over the outer surfaces of the flaps, so as to remove a scant quarter of an inch of mucous membrane. Unless this is done, the line of union is apt to show a deep depression after repair, as in twisting the sutures the outer margin of the rent inverts, and, unless the inverted edge is freshened, union cannot take place.

"The parts being prepared, the male blade (*A*, Fig. 3831) is first taken, and the needle placed at that point on the posterior flap, letting its point slightly penetrate so as to hold it where it is desirable to make the first stitch. The slot of the female blade *B* is then adjusted, the tip of the blade resting lightly upon the anterior flap. The lower or posterior flap is elongated in advance of the anterior, and, in order that the needle may be made to pierce both flaps at opposite points, the anterior one must be drawn down by means of a tenaculum to correspond in length to the posterior flap. While the flap is being elongated it may be necessary to slide it laterally, one way or the other, so as to secure lateral as well as longitudinal coaptation. When this adjustment is effected, the needle-forceps is closed. No. 30, or 31,

FIG. 3832.—Van de Warker's Needle Forceps.



or 32 wire is then passed, looped, into the slot of the needle, which is then ready to be withdrawn. The female blade is removed and turned over, its extremity placed under the lower, or left hand, flap, and between it and the extremity of the male blade. The slot in the female blade then drops on the button of the extension upon the male blade. If the reader will examine Fig. 3832, he will observe that by closing the handles the extremities of the two blades are separated, which action must, of course, withdraw the needle. The needle need not be passed as deeply as some operators are in the practice of doing. If, in paring the surface of the rent, a greater part of the tissue be removed from the outer margins, it follows that, by bringing these margins in contact, apposition is secured through the whole width of the denuded surfaces. It is, I think, a very simple manipulation. One great saving in time is in sponging. The only part of the operation during which I sponge is in paring. Here you need to see, especially in the final touches. But, in passing the suture, once place the needle where you want it, and if it does not transfix the opposite flap just

GYNÆCOLOGICAL.

TRACHELORRHAPHY, HYSTERO-TRACHELORRHAPHY.

Repair of Lacerations of the Cervix Uteri. (Continued.)

where you want it, the error lies in the manner you have manipulated the flap by the tenaculum, and not in passing the needle. Hence, no sponging in this stage is required, as in the other method with needle and needle-holder. Some operators place considerable stress upon the direction in which the needle is passed to secure proper adjustment of the flaps. My way in doing this is in shaping the flap. No other way appears practical to me. No matter how you pass the needle, so far as it secures apposition of the freshened surfaces, the line of traction of the suture is determined by the direction in which its free ends are tied or twisted together."—*American Journal of Obstetrics*, July, 1883.

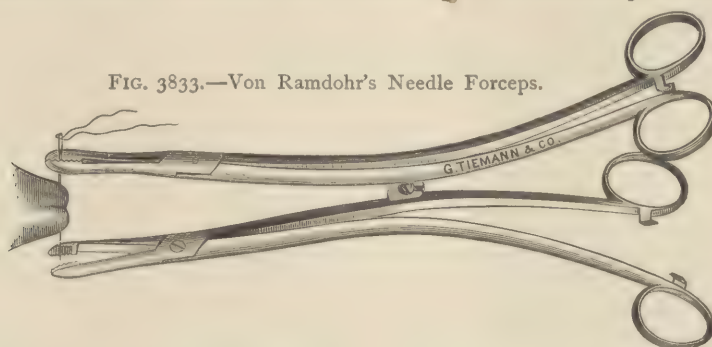


FIG. 3833.—Von Ramdohr's Needle Forceps.

"They consist of two needle-forceps, which may be united or separated by a pivot and notch-lock at their middle. The *modus operandi* is as follows: A straight needle is clasped at a right angle in the right hand forceps. It is pushed through both lips, then the open left hand forceps is hooked on the pivot and its open branches pressed against the cervix until the point of the needle lies between the branches. They are then closed, grasping the point of the needle, which is then withdrawn, having previously released the eye by opening the lock of the right hand forceps."—C. A. Von Ramdohr. November 4th, 1882.

PERINEORRHAPHY.

Repair of Lacerations of the Female Perinæum.

"Parturition is the great exciting cause of the accident; it is almost never met with in nulliparous women, except after removal of large tumors per vaginam, and then it is usually of little moment.

"*Time for Operation.*—Upon this point authorities differ widely—some urging immediate action, some advising delay until the effects of parturition have entirely passed away, while others compromise the matter by giving preference to the plan of waiting a few days only. To the first class belong Baker Brown, Demarquay, Scanzoni, Simon, and others of equal weight. Scanzoni thus clearly points out the advantage of early interference: 'The operation should be performed just after the delivery, because it is more likely that the bleeding lips of the wound will then unite, and because vivification of the edges not being necessary, the procedure is simpler and less dangerous.' The worst cases of the accident with which we meet generally follow instrumental or manual delivery, and, when the discovery of its occurrence is made, the patient will usually be in a profound anæsthetic sleep. Every operator should be prepared, under such circumstances, to attempt repair of the injury: for, if he succeed, the patient will be saved much suffering, while failure will not in any wise depreciate her condition. For this reason no case of obstetrical instruments should be considered complete which has not in it needles and sutures for performance of this operation.

"I have commonly resorted to immediate operation, and the result of my experience leads me always to adopt it, unless the sphincter ani and recto-vaginal wall be so profoundly implicated in the laceration as to make the operation a serious and lengthy one, or necessarily to insure the passage of lochial discharge between the lips of the wound. Among those who are opposed to immediate interference are Roux and Velpeau; while Nélaton, Verneuil and Maisonneuve advise delay for a few days, when all hæmorrhage will have ceased and the edges of the wound be covered by granulations. There are three circumstances which tend to defeat the success of immediate operation: First, it is often performed by one not habituated to its performance, and, being practiced upon a woman who, having just been delivered, is exposed to the danger of post-partum hæmorrhage and surrounded by anxious friends, it is likely to be finished too hastily; second, the lochial discharge, constantly passing over the lips of the wound, is very likely to enter and prevent union: third, the operator having been taught to regard the perineum as the superficial layer of tissues intervening between the fourchette and anus, closes this by correspondingly superficial sutures, leaves the upper portion

GYNÆCOLOGICAL.

PERINEORRHAPHY.

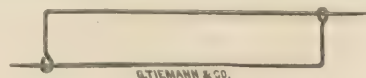
Repair of Lacerations of the Female Perinæum. (Continued.)

of the perineal body open, creates a pouch for the accumulation of putrefying materials, and leaves the anterior vaginal wall and bladder without support in the future. My advice and practice, with regard to this point, are decidedly to give the patient the benefit of the doubt, and to close the rupture at once. If failure follow, however, never, unless there be some special reason for so doing, attempt another operation before the results of parturition have entirely passed away. This will not be before the lapse of two months from the time of delivery; just after delivery there is reason for operating which has passed away in a fortnight. When immediate operation becomes the rule of obstetric practice, the number of cases of disease thus occurring will at once and very decidedly diminish. But the full results of immediate operation will never be exhibited until the obstetrician studies the anatomy of this part, and learns how to approximate its entire divided surface by sutures carried up to the highest point at which solution of continuity has occurred.

"Treatment of Cases which have Cicatrized.—The operation now generally adopted in these cases, and which has received the name of perineorrhaphy, consists in vivification of the edges of the lips of the wound and their approximation by sutures. Although the accident for which this procedure is instituted was described by the ancients, no surgical means of cure were ever devised for it until the time of Ambrose Paré. He advised the suture, and was followed in its use by his pupil Guillemeau. Subsequently it was employed by Delamotte, Saucerotte, Trainel, Noel, and others. Dieffenbach employed it successfully, adding to the operation oblique lateral incisions involving the skin and areolar tissue, for the purpose of relieving tension upon the parts brought together by suture. About the year 1832, Roux, of Paris, obtained the most brilliant results from the operation, and probably its elevation to the position of a reliable surgical procedure was due more to his achievements than to those of any other individual. He employed the quilled suture, and cured by it four out of the first five cases operated upon. Of late years great advances have been made in the operation by Mr. Brown, in England; Verneuil, Laugier, Demarquay, and others, in France; Langenbeck and Simon, in Germany; and Sims, Emmet, Agnew, and others, in the United States.

"Instruments and Appliances Needed.—These will consist of a long handled curved scissors (Fig. 3295); a bistoury with narrow blade; a toothed forceps (Fig. 3226); a tenaculum (Fig. 3264); twelve sponges fixed in handles ten inches long (Fig. 3254); artery forceps; silk ligatures, and straight darning needles, threaded with silk which is double and tied at the eye of the needle by as small a knot as possible. A basin of water should be in readiness to receive the bloody sponges, and a pitcher, bucket or other reservoir at hand to supply more when this is to be changed. The instruments should be kept immersed in carbolized water, with which the parts should be freely bathed. Let the operator keep clearly in mind the shape and dimensions of the body which he is about to restore. It is a triangle with apex above and base below. Two surfaces of this shape are to be vivified and held face to face by sutures. That is the whole operation."—For further description, see "Thomas, on the Diseases of Women," page 192. 1880.

FIG. 3834.—Marcy's Perineal Safety Pin.



"It is made of german silver wire, guage No. 21 or 22. The end is bent in a small loop and turned one-fourth of an inch therefrom at a right angle, and the shaft is two to two and a half inches in length, and sharpened like the point of the needle of a subcutaneous syringe. The one half is introduced from the vagina, *within* outward, quite deep into the connective tissue laterally—the direction being determined by the finger placed in the rectum, to which the pin should be parallel. The other half of the pin, similarly constructed, is introduced from *without* inward upon the opposite side, in the same manner, the point of which is caught in the loop of the first part and adjusted without. Thus a kind of 'safety pin' is constructed, and, when fitted to retain properly the enclosed portions, the loops are clamped down by the compression forceps, and the ends cut square. This is found to hold sufficiently firm; but, at first, fearing it might not be sufficiently secure, I also clamped a perforated shot upon the wire. The shot renders the end of the pin less liable to cause irritation. If properly adjusted, the elasticity of the wire compensates for the colateral œdema, and does not impair the circulation in the enclosed parts, while complete approximation is obtained, and no force is exercised in the direction of the long axis of the triangle. Two to four pins are required, as the case may demand. The subsequent treatment consists, in most cases, of a daily washing out of the rectum by means of a large double rubber tube with a considerable quantity, usually three or four quarts, of water as hot as comfortable to bear. Upon the eighth or tenth day, as thought wise, each pin is gently pushed upwards, and the vaginal end exposed. Each side is then cut off near the juncture and withdrawn."—Henry O. Marcy, M. D., *Journal of the American Medical Association*, October 27th, 1883.

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PERINEORRHAPHY.

Repair of Lacerations of the Female Perinæum.

FIG. 3835.—Agnew's Needle-Holder and Needles.



FIG. 3836.—Agnew's Forceps, with Adjuster.



FIG. 3837.—Shot Compressor.

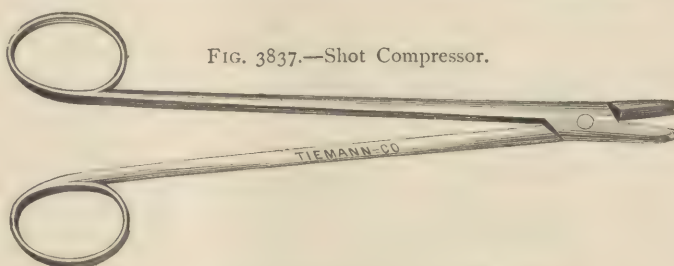


FIG. 3838.—Helical Needle for Ruptured Perineum.



FIG. 3839.—Peaslee's Perineum Needles (detachable handle.)

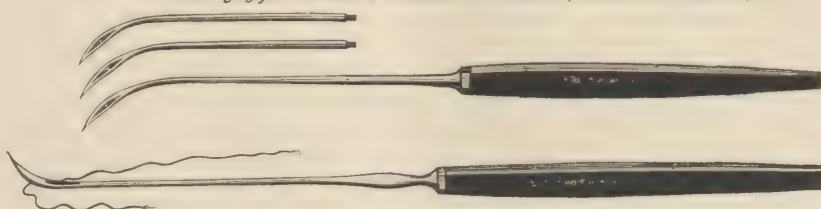


FIG. 3840.
Ashton's
Perineum Needle.



FIG. 3841.—Peaslee's Perineum Needle (right and left).



FIG. 3842.—Parker's Perineum Needles (encased in handle.)

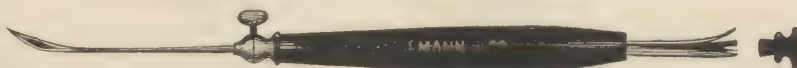


FIG. 3843.—Skene's Needle for Ruptured Perineum.



FIG. 3844.—Usual Perineum Needle.



GYNÆCOLOGICAL.

PERINEORRHAPHY.

Repair of Lacerations of the Female Perinæum.

FIG. 3845.—Parker's Perinæum Needle and Clamp.

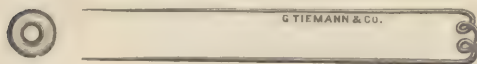


FIG. 3846.—Munson's Quill Suture Stay.

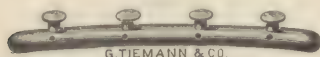
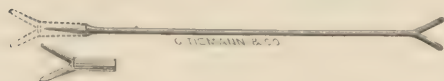


FIG. 3847.—Brickell's Perineal Stay.



A PERINEAL PIN FOR LACERATIONS.

Dr. S. M. Monser's (of San Francisco, Cal.) method of adjusting a lacerated perineum: He uses a number of ordinary small safety-pins, either silver or nickel plated. A smooth shirt-button is first passed over the point of the pin and carried back as far as the spring. Then the pin is inserted at a distance of about one-half its length from the rent, and emerges at an equal distance on the other side. A second button is then slipped over the point and the pin is fastened. The points of entrance and exit should be far enough from the line of laceration to insure firm coaptation of the wounded surfaces. The advantage claimed for this appliance over the ordinary suture is that it causes no strangulation of the tissues and little if any irritation. Dr. Monser states that he has used it with satisfaction to himself and comfort to his patient, and has obtained better results with it than with any other form of suture.

Agnew's Set of Instruments for Ruptured Perineum.

\$24.35.

1 Scalpel.	1 pair of Agnew's Forceps, with Adjuster.	2 skeins Silk Ligature.	1 Probe-pointed Bistoury.
1 Ashton's Needle.	4 Curved Suture Needles.	6 pieces of Cane or Bougie for Quill Sutures.	
1 Agnew's Needle-holder and 3 Needles.		1 skein of Twine.	1 piece of Wax.
1 pair Curved Scissors.	2 coils of Silver Wire.	1 Mahogany or Rosewood Case, lined with oil-dyed velvet.	
1 Shot Compressor.	1 Tenaculum.		

Closure of the Vagina.

"The procedure is resorted to in despair of accomplishing the cure of vesico-vaginal fistula, and in the hope of relieving the patient from the intolerable annoyance attendant upon an involuntary and constant discharge of urine. It does not, of course, equal in efficiency closure of the vesical fistula, since it involves the necessity of the urine being retained in the vaginal canal, which is injured by its presence, and is proposed only for those cases in which, from extensive destruction of tissue, no hope of closure by suture can be entertained. By it the vagina and bladder are rendered a common receptacle for urine and menstrual blood, the only advantage gained consisting in the fact that they may be retained and discharged at will through the urethra, which remains open."

Episiorrhaphy.

"Closure of the vagina may be accomplished by two operations, episiorrhaphy and obliteration of the canal. The first originated with Vidal de Cassis, and consists in paring the inner surfaces of the labia majora and uniting them by sutures, so as to cause their complete adhesion."

Kolpokleisis.

"This consists in paring the vaginal walls. Strips of mucous membrane being taken away and the bleeding surfaces brought in contact by suture, the bladder is kept empty by a catheter until union has occurred. This operation was first performed by Prof. Simon in 1855, and since that time has been resorted to in Germany, and many cases suffering from incontinence of urine, due to great loss at the base of the bladder, have been relieved by it."—"Thomas, On Diseases of Women." 1880.

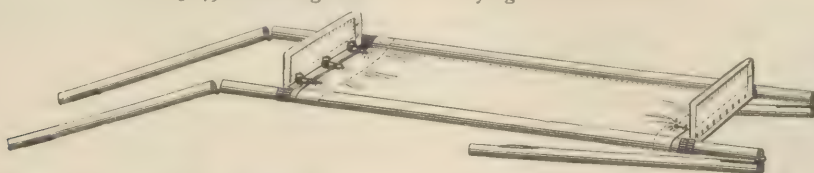
Dr. Emmet's Objections to Kolpokleisis.—"From my own observation I have learned that it is but a question of a few months, a year, or possibly two, before serious consequences must arise after leaving a receptacle, like a portion of the vagina, in which the urine may stagnate. To give a retentive power for a short time is not a sufficient compensation for the suffering and consequences which supervene. As the result of my experience, I would urge that the operation should never be resorted to under any circumstances. The maximum has now been reduced to two or three per cent. of cases where the resources of the surgeon cannot overcome all the difficulties which may be presented in closing a vesico-vaginal fistula. Something more may be accomplished in the future; but at present these incurable cases are better without the retentive power gained by kolpokleisis."—"Emmet's Principles and Practice of Gynæcology." 1884.

WOUNDS AND INJURIES.

WOUNDS.

"Wound (Sax. *vuna*), *vulnus* (diminutive *vulnusculum*), *volnus*, *pla'ga*, *trau'ma*, *tro'ma*, *tre'sis*, *tre'sis vul'nus*, *bla'be*, *tym'ma*, (F. *plaie*, *blessure*). A solution of continuity in the soft parts, produced by some mechanical agent.—Wounds present innumerable differences: as regards their situation, the parts interested, their direction, size, shape, the nature of the instrument or agent by which they are produced; their more or less simple or complex character, duration, &c. A wound is called *incised* (F. *coupure*, *incision*), when made by a cutting instrument; *punctured*, *nyg'ma* (F. *pique*), when made by a pointed instrument; *lacerated* (F. *déchirure*, *plaie par arrachement*), when the parts are lacerated or torn by the wounding body; *poisoned*, *celluli'tis venen'ata*, *necu'sia* (F. *plaie envenimée*), when some virulent or venomous substance has been introduced; and *contused* (F. *plaie contuse*), when produced by a blunt body. *Gun-shot wounds*, *sclopetopla'ga*, *vul'nera sclopetaria*, seu à *sclope'tis*, seu *sclopet'ica* (F. *plaies d'armes à feu* or *d'arquebuse* or *d'arquebuse, coup de feu*), belong to the last division. Lesions produced in battle are classed by Dr. Farr under *polem'ici* (*morbi*)."—DUNGLISON.

FIG. 3849.—Folding Litter for Carrying Wounded Persons.



Litters of all patterns made to order at various prices, depending upon style and finish.

General Rules for the Treatment of Wounds and Injuries.

"1. The first and most important principle in the treatment of wounds is to keep at a distance all injurious influences which can hinder or retard the healing. Therefore every method of treatment should be rejected which introduces new noxious influences.

"2. *Rest* is the most important condition for rapid healing. The injured part must be, therefore, placed at rest (immobilized, made immovable), and absolute rest in bed must be observed in all severe injuries, at any rate at the commencement. Every unnecessary disturbance (touching, examination, probing, squeezing, &c.) of a wound is to be avoided.

"3. Venous stasis hinders the healing. By elevating the limb care is taken that the escape of venous blood and lymph from the injured part is not impeded; and the removal of any strangulation (such as constricting clothes or bandages) must never be omitted.

"4. The retention of the secretions of the wound tends to suppuration, to traumatic fever, and to other accidental complications. A free escape for the secretions of the wound is, therefore, always to be considered as one of the most important principles in the treatment of wounds. There should be no hermetical sealing of wounds, but an escape must be provided by the secretions, by introducing rubber tubes (Chassaignac's drainage tubes, page 75) as deeply as possible, and by an early removal of the sutures. One suture too tightly drawn may result in the death of the patient.

"5. Any contamination of a wound may call forth in it decomposition and putrefaction, and with them the accidental complications which retard its healing and endanger the life of the patient. Care for the most scrupulous cleanliness (of the fingers, instruments, bandages, linen, water and air) is, therefore, the first duty of the surgeon, as well as of the attendants.

The Covering of Wounds.

"For protection against injurious influences from without, for the *dressing* of wounds, there are used:

"1. *Compresses*—pieces of old soft linen, moistened with some fluid or ointment which prevents the hermetical closing which would arise from their adhering to the wound. It is best, for this purpose, to make holes through these compresses with a punch, or to change them into so-called 'gitter-charpie,' by drawing out the threads.

"2. *Charpie*—plucked from clean old soft linen with clean fingers, and placed beneath the compress, serves to suck up all the secretions of the wound and certainly answers for this purpose better than all other substitutes. As it is always possible that the charpie contains infectious matter, it should be made harmless before its application by boiling and soaking in disinfecting agents (such as carbolic acid, salicylic acid, &c.) Lately too, in its place, many of the following materials have been brought into use.

"3. *Cotton Wool*.—The common wool serves for wrapping up wounded parts; this wool, purified and freed from grease by boiling in alkalis (charpie wool, Brun's wool dressing) serves for soaking up the secretions of the wound; it is not intended to be applied directly, upon the surface of the wound, because the loose fibres of cotton become matted to the granulations.

"4. *Lint*—a woven felted cotton, when soaked in oil or water, is a good dressing.

WOUNDS AND INJURIES.

WOUNDS.

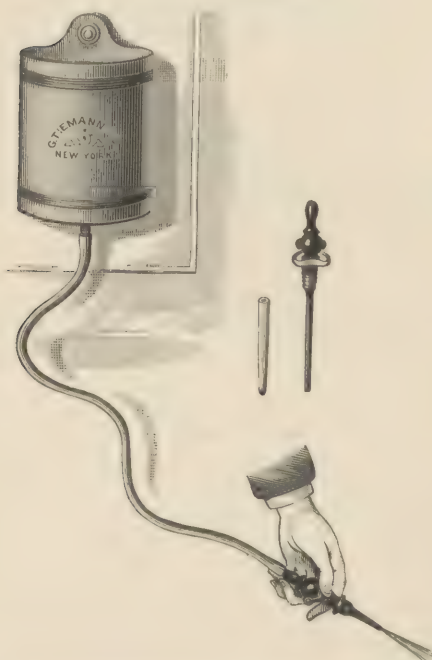
The Covering of Wounds. (Continued.)

"5. *Oakum*—plucked from old ship's rope thoroughly soaked with tar, acts as a desinfectant and absorbent agent, but is somewhat too hard for irritable wounds. The same may be said of jute.

"6. *Waterproof materials*—as oil-silk, oil-cloth, gutta-percha tissue, india-rubber material, or varnished silk paper, serve for covering and keeping moist the dressings and for the protection of the bed-linen.

"7. *Cradles*—made of bent wire and wood (wire arch), or of barrel hoops, are placed over the injured parts, so as to protect them against the accidental contact and pressure of the bed-clothes."

FIG. 3850.—Esmarch's Irrigator.



Cleansing of Wounds and their Vicinity.

For this purpose there are used:

"1. *The Wound Douche* (Esmarch's irrigator)—by means of which a stream of water (disinfected by the addition of carbolic acid, permanganate of potassium, acetate of alumina, salicylic acid, &c.) is conducted over the surface of the wound. The force of the stream is regulated by the pressure of two fingers holding the pipe, by raising or lowering the douche (or by the stop-cock). For washing out the cavities of wounds and sinuses a soft point of vulcanized india-rubber may be placed on the nozzle. Care is taken not to inject the sinuses with too strong a pressure, because in this manner the fluid may be driven into the cellular tissue and produce a violent inflammation. The use of the syringe also is to be discouraged, because less control is obtained over the action of the stream than with the irrigator.

"2. *To catch the water and pus* as it runs away, basins* of various shapes and sizes are used, made of metal or hard rubber, the edges of which fit the various parts of the body.

"3. *The surface of the wound itself should never, under ordinary circumstances, be unnecessarily disturbed.* For wiping away pus in the neighborhood of the wound, charpie-wadding soaked in a weak solution of carbolic acid is used, or the antiseptic balls (Fig. 3853). Sponges must only be used for cleaning wounds and their neighborhood, when all impurities contained in them are removed or rendered harmless. To thoroughly clean bath sponges they must be first repeatedly squeezed out in hot water, then dried, and beaten with a wooden stick till they no longer contain any sand.

Sponges which have been used are freed from grease in a hot concentrated solution of soda. They are then placed for twenty-four hours in a solution of permanganate of potash (1:500), and again washed in clean water; after that they are soaked in a (1 per cent.) solution of the commercial salt of subsulphite of soda, to which is added 8 per cent. of the pure concentrated hydrochloric acid, until (in about a quarter of an hour) they have become white; and, lastly, they are again washed in clean water until they are entirely scentless. They must be kept in a strong solution (5 per cent.) of carbolic acid. Before being used they are laid in a weak solution (2½ per cent.) of carbolic acid, and while in use they are constantly cleaned in this weak solution.

"4. *For thoroughly cleaning* the injured parts of the body, the common baths (with the addition of soap, soda, acetate of alumina, &c.) are employed, as well as local baths." (Figs. 1246, 1247.)

The Reduction of Heat.

"For subduing the inflammation, *cold*, by the abstraction of heat, is of service, and this is employed in various ways:

"1. In the form of *Cold Wrappings*.—They must be very frequently changed, if heat is to be constantly abstracted, but this easily disturbs the injured part. If one allows them to remain longer, so that they become hot, they act as excitants (Priesnitz's wrappings).

"2. As *Dry Cold*—by ice in india-rubber bags (see page 40). If the direct application of the ice-bag is too cold, some layers of linen are laid between the ice-bag and the part. Glass bottles and tin boxes filled with ice or cold water abstract the heat more energetically than india rubber bags, but they are not so well applied to the body. A very energetic cooling in inflammations of the extremities can be produced by the *cooling coil*. This is the name given to a long

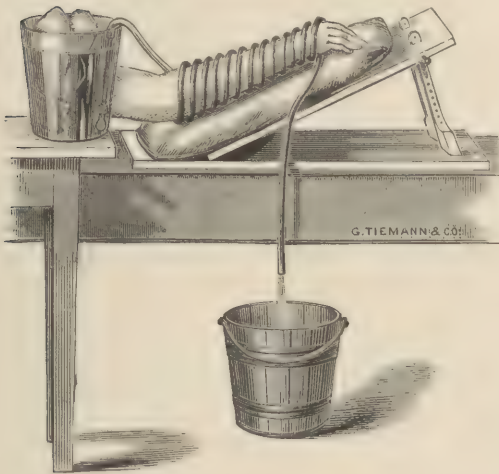
* See pages 75 and 195.

WOUNDS AND INJURIES.

WOUNDS.

The Reduction of Heat. (Continued.)

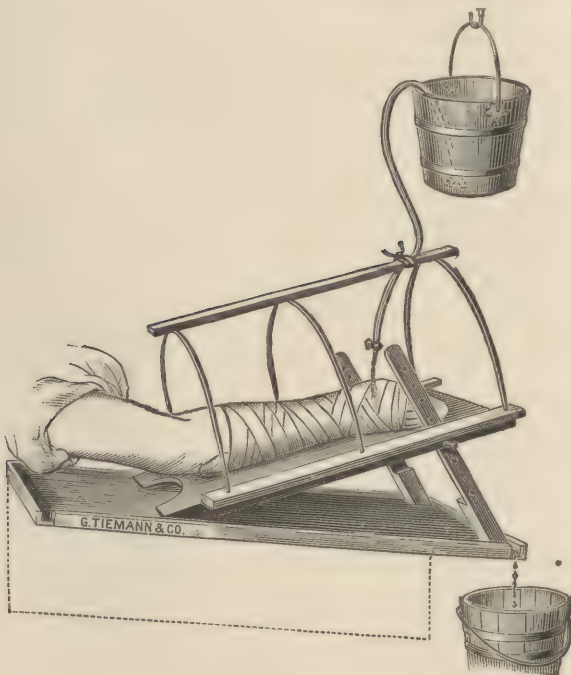
FIG. 3851.—Esmarch's Cooling Coil.



india-rubber tube, which is wound in serpentine turns around the inflamed part; one end of this tube, provided with a perforated tin block, is sunk into a pail filled with ice-water, whilst the other end hangs down into an empty pail. By sucking at the latter a current is produced, which can be regulated by the compression of a ligature. When the upper pail becomes empty it is refilled by pouring in the water which has escaped.

"3. By *Irrigation* with cold water.—Out of an irrigator (Fig. 3850) hung over the bed, cold water is dropped on the injured part, which is covered with linen; in this the water diffuses itself. By inserting a straw into the nozzle of the irrigator the rapidity of the falling drops is regulated. In place of the irrigator an india-rubber tube can be used, provided at one end with a stop-cock, at the other with a perforated block of tin, which is sunk into a bucket filled with water. This tube then acts as a syphon, and must be set in action by sucking. The effect of irrigation in the reduction of heat is very great in consequence of the evaporation of the water. It is not, therefore, necessary to employ water of a very low temperature. The water, as it runs away, must be caught upon an oblique plain, or upon a waterproof (oil-cloth) beneath the limb, and guided into a pail standing below. (Fig. 3852.)

FIG. 3852.—Syphon.



"4. By *Immersion* in cold water.—To carry out this treatment the arm- and leg-baths (see page 42) are used: the injured limb being laid upon strips of bandages, which are fastened to the buttons on both sides of the bath.

"This method of abstracting heat is especially suitable for recent injuries of the hands and feet. It does not require a very low temperature, for the action of the permanent bath is very energetic. Water from 16 to 18° R. (68 to 72½° F.), by a long duration in the bath, produces a very perceptible cooling effect. The regulation of the temperature, by pouring in cold water, can generally be left to the patient himself.

The Hermetical Sealing of Wounds.

"For keeping septic matters from the wound, dressings for procuring complete closure are employed, as well as Lister's antiseptic method.

"Hermetical sealing aims at producing a dry scab upon a recent wound, which remains firmly adherent till cicatrization ensues. Open wounds can by this treatment heal without suppuration, like subcutaneous ones, and, when successful, putrefaction is avoided. This method is successful—

"1. In *superficial injuries*—scratches, burns, abrasions, &c.—by powdering with flour, charcoal, chalk, potter's clay, gum arabic; by drying the surface with a stream of air (from a pair of bellows); by slight corrosion with caustic or caustic or carbolic acid; or by covering with cotton wool.

"2. In *deeper complicated wounds* (with fracture, injury to a joint, &c.), by covering the bloody wound with clean and disinfected wool, teased charpie, lint or German tinder, which form with the blood a dry crust. Over this a thick layer of cotton-wool is laid, and over all a water-proof material is fastened with a moistened gauze-bandage.

WOUNDS AND INJURIES.

WOUNDS.

Lister's Method of Antiseptic Dressing.

"This also aims at keeping from the wound all sources of putrefaction (hovering in the air and clinging to every object), or at rendering them harmless by antiseptic means, which should not, however, excite the wound to (a septic) suppuration.

"1. For operations, the skin around the seat of operation, and everything which comes in contact with the wound (the hands of the operator and of the assistants, the instruments, &c.), after previous careful cleaning with soap and brush, is disinfected by washing with a strong (5 per cent.) solution of carbolic acid.

"2. During the whole operation and at every change of dressing, the air in the neighborhood of the wound is perpetually filled with a fine mist of a weak solution ($2\frac{1}{2}$ per cent.) of carbolic acid. In order to produce this mist the carbolic spray is employed.* During lengthy operations and dressings the spray can be momentarily interrupted, if the wound is in the meantime guarded by being covered with a linen rag soaked in a weak solution of carbolic acid. The sponges which are used at the operations must, after they are thoroughly cleaned and boiled, be kept in the strong carbolic solution, and, before as well as during the operation, be squeezed out in the weak solution. In the place of the sponges the antiseptic balls can be used. These are balls of salicylic wool, salicylic jute, or salicylic charpie, tied up in salicylic gauze.

"3. Wounds which have already been exposed to the air, and operation wounds which at the operation have come in contact with infectious matter, must before the application of the dressing be disinfected by washing with the strong (5 per cent.) solution of carbolic acid; this does not retard healing by first intention. If suppuration has already set in, a stronger disinfection with 8 per cent. solution of chloride of zinc is required for thoroughly washing out the wound.

FIG. 3853.
Antiseptic Ball.



"4. Every bleeding point is to be carefully ligatured with carbolized catgut, and the ends of the latter cut off close to the knot. After some time they are completely dissolved in the interior of the wound and absorbed.

"5. The wounds are carefully sewn with silver wire or carbolized silk (uncolored silk which has lain for half an hour in a mixture of melted wax and carbolic acid).

"6. Draining tubes, well perforated, and carbolized by being kept in a strong solution of carbolic acid, are pushed into the deepest parts of the wound; and a careful compression is made upon the cavities of the wound by carbolized sponges, or pads of carbolized gauze, wool, salicylic wool, or jute. These are the means used to prevent the retention of the secretions of the wound.

"7. In immediate contact with the wound is laid a piece of protective silk, steeped in a weak carbolic solution; this protects the wound against the direct influence of the carbolic acid, and, at the same time, when the dressing is changed, it indicates by an alteration in color (dirty-grey sulphuret of lead) whether decomposition has taken place.

"8. Over the 'protective' a layer of carbolized gauze in eight folds is laid, which extends beyond the edges of the wound more than a hand's breadth; between the seventh and the eighth fold is placed a piece of mackintosh or varnished silk paper, which prevents the secretion from the wound penetrating directly through to the upper surface. The whole is fastened on with gauze bandages.

"9. The dressing must be renewed in the same way as often as the secretions of the wound appear at the edges of the dressing; at first once or twice a day, later on every two or three days, and at last much less frequently. The dressing is to be changed as quickly as possible. The neighborhood of the wound is cleansed with the irrigator and cotton wadding soaked in the weak carbolic solution. The cavity of the wound is not needlessly washed out. Only when the silk has become discolored must it be disinfected afresh with the strong carbolic solution. The drainage tubes are changed after some time, or replaced by thinner ones, and as soon as possible left out altogether.

"10. If it is undesirable or impossible to renew the dressing frequently, the double antiseptic dressing is applied, the deeper layer of which consists of the 'protective' and a compress, soaked in a solution of carbolic acid, which is fixed by a gauze bandage; over this come then the dry layers and the sheet of mackintosh. The deep layer can remain for weeks, and is only moistened at each dressing with the carbolic solution.

"11. In default of Lister's dry antiseptic gauze, *Bardleben's moist carbolic dressing* can be used. Over the 'protective' are laid many folds of gauze which has first lain for twelve hours in a strong carbolic solution, then been squeezed out and kept in a fresh 1 per cent. solution of carbolic acid. As soon as the secretion from the wound penetrates anywhere to the surface, new layers of the moist gauze are put on.

"12. Boracic acid also acts as an antiseptic and can be used for superficial wounds, burns and granulating surfaces, either in the form of a watery solution (1:30) in which is dipped the lint or gauze, or as an ointment (1:2 lard) [*Chiene*].

WOUNDS AND INJURIES.

WOUNDS.

Lister's Method of Antiseptic Dressing. (Continued.)

"13. *Salicylic acid*, which has been recommended by *Thiersch*, and lately so much employed, especially in combination with the carbolic dressing, has a similar effect, although not quite so certain an antiseptic as carbolic acid. It can be employed in a watery solution (1:300), both for the spray and for impregnating the materials for dressing, for washing the instruments, hands, &c., but it is especially used for impregnating the materials for dressings, namely the wool and jute. *Jute* (prepared Arrakanian hemp), on account of its permeability, is especially fitted for antiseptic dressing.—"The Surgeon's Handbook." Dr. Friedrich Esmarch.

Solutions.

"For irrigating wounds, submerging instruments, and disinfecting in general, solutions of corrosive sublimate and carbolic acid are necessary, and pure alcohol, iodoform, and chloride of zinc solutions may at times be used.

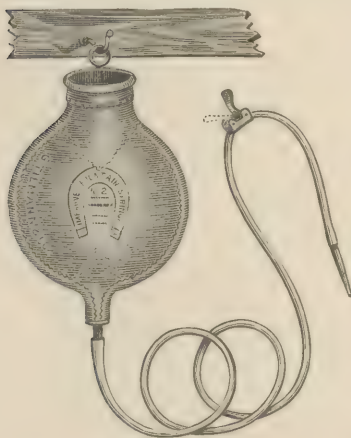
"Koch has demonstrated that, as a germ-killer, *corrosive sublimate* excels all known agents. The sublimate solutions vary in the proportion of one part of the bichloride to five hundred parts of distilled water by weight, or 1 to 500, 1 to 1,000, 1 to 2,000, 1 to 3,000, for use outside of the great cavities, and 1 to 8,000, 1 to 15,000, and 1 to 20,000 within the cavities.

"The sublimate solutions are only used for irrigation and for disinfecting the hands, sponges and gauze. All instruments are submerged in carbolic acid solutions or in alcohol. The stronger solutions, 1 to 500 and 1 to 1,000, are rarely employed in irrigation, and then only when the part exposed has been made bloodless by Esmarch's bandage. Even when thus employed for the disinfection of an abscess cavity, ulcer, or sinus, the excess of sublimate should be immediately washed away by flooding the parts with the 1 to 3,000 solution. In any ordinary operation no stronger sublimate than 1 to 3,000 will be required; a 1 to 10,000 solution may be used in the peritoneal or thoracic cavity where the conditions are such that the fluid may run out or be removed at once by sponges. I have filled the entire abdominal cavity with warm sublimate, 1 to 18,000, mopping it out with sponges, and repeating the procedure three times without any bad symptoms resulting.

"For convenience, any required solution may be made from the following: Corrosive sublimate, grs. xxx., water and glycerine, each ʒ ss. Some add to this about grs. x. of table salt. One teaspoonful of this solution, added to a pint of water, approximates 1 to 2,000. Water containing lime should not be used. Tablets of corrosive sublimate are now manufactured and are very convenient for transportation. Each tablet contains enough sublimate to make, when dissolved in a pint of water, a 1 to 1,000 solution. It is best to make fresh solutions when needed, for, unless kept tightly corked and away from light, they deteriorate in value.

"*Carbolic acid* (1 to 20, or a 5 per cent. solution, is employed for the cleansing and submerging of all instruments used in a surgical operation. It is not used in irrigating, on account of its irritating properties.

Fig. 3854.—Wyeth's Douche.



"The steam and carbolic spray, so much in vogue a few years since, is now only used to lay the dust, or as an aid toward the more thorough cleansing of operating rooms and wards which are especially exposed to infection. The spray machine (Fig. 1261) is started one-half hour before the operation is to commence, and is allowed to run until that time. The strength of the solution in the bottle is 1 to 20. As ordinarily sold, carbolic acid is dissolved in alcohol, and is about 95 per cent. strong. In this condition an ounce by measurement is an ounce by weight. To this quantity add glycerine, ʒ j, and water, ʒ xix., which will make a 1 to 20, or 5 per cent. solution. All instruments are immersed in this solution a half-hour before the operation, except the blades of knives, which should be dipped in only a minute or two before being used.

"*Pure alcohol* is also used for this purpose by some operators who dislike the benumbing effects of the acid.

"*Iodoform*, one part dissolved in seven parts of *ether*, is used at times to wash the parts where an operative wound is to be made. It is not an uncommon practice with some of the German surgeons to immerse all the ligatures and suture-material in this solution for about twenty minutes before the operation is begun.

"*Chloride of zinc* solution in water (1 to 12, about 8 per cent.) may be used to wash out ulcers or old sinuses which are in the neighborhood of, or communicate with the wound of operation. This and the iodoform solutions are not, however, essential, and are now rarely employed."—"Wyeth's Text Book on Surgery." 1887.

WOUNDS AND INJURIES.

WOUNDS.

The Union of Wounds.

"To unite the edges of wounds, which have no tendency to slough (incisions and incised wounds), we make use of:

"1. *Strips of adhesive plaster.* They are on the whole seldom used, because the plaster easily irritates the skin, produces erythema and eczema, and causes the retention of the secretions of the wound.

"2. *Strips of gauze-bandage,* which are fastened on both sides of the wound with collodion (gun-cotton dissolved in ether) or with gutta-percha dissolved in chloroform.

"3. *Starch-bandage,* dipped in water and applied over the edges of the wound, which are adapted by the fingers, presses the edges well without keeping back the secretions of the wound. In many cases it is better to roll up the bandage from both ends, and with it to press the edges of the wound together from both sides.

FIG. 3855.



FIG. 3856.

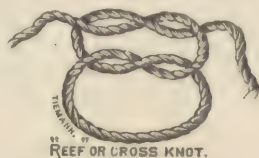


FIG. 3857.



FIG. 3858.



"4. *Sutures.*—*a.* The interrupted suture (Fig. 3855) is applied by more or less curved needles* with waxed or carbolized silk, twine, horse-hair, catgut, and silver or iron wire.† It is important to finish the stitch with a safe double knot, which does not itself become loose. For this purpose the reef knot is used, in which the threads pass respectively beneath and above the corresponding loops, while in the false knot or 'granny,' which is *not* secure, the threads on each side pass one above and the other below the loop. When the edges of the wound are considerably strained, it is best, in the first knot, to twist the ends of the thread twice around each other (Fig. 3858, surgeon's knot), and on that to tie the second, as in the reef knot.

"*b.* The twisted suture is applied by means of insect-needles (Carlsbad needles), whose points are beaten flat and sharpened in the form of a lance. When they have been carried through the skin at some distance from the edges of the wound, they are wrapped around with thick cotton threads in alternating circles and figures of eight, so that the edges of the skin are pressed firmly against each other. The ends of the needles are then nipped off with a pair of

FIG. 3859.—The Twisted Suture.

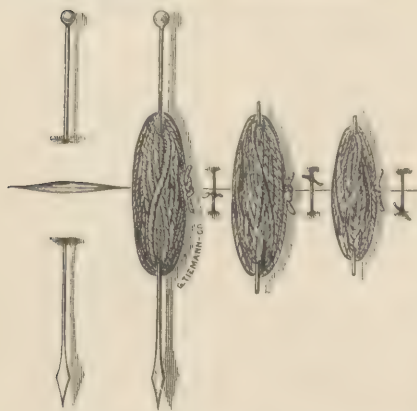
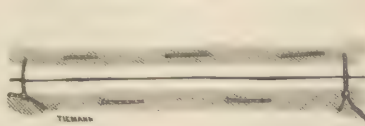


FIG. 3860.—The Fold Suture.



pliers. To unite the edges of the wound more accurately, a few fine interrupted sutures are placed in the intervals between the needles. The remains of the needles can be drawn out on the second day, with a twisting motion, by means of a pair of pincers, but the pads of thread which are generally glued to the skin by the blood, are allowed to remain some days. This suture is especially adapted for large gaping wounds of the face, such as commonly occur in plastic operations.

"*c.* The fold suture (*Faltennaht*) serves for the union of very thin and flaccid edges of skin, which are by this method raised to a fold, and the surfaces in contact increased."—ESMARCH.

"*Preparation of Catgut.*—Select four sizes of the best quality, one dozen each the size of E and A violin strings, six D strings and two or three about twice the size of D violin. Remove the small red threads which are tied around each bunch, and place the catgut in a glass bottle or jar which contains enough *pure oil of juniper berries* to completely cover them. The vessel should be tightly corked to prevent evaporation. Within twenty-four hours the material is safely aseptic and will remain so indefinitely if kept immersed in the fluid. The strength of the catgut is not impaired, while its firmness is increased by the oil."—WYETH.

"Macewen has introduced a *chromic acid catgut* ligature, which resists absorption much longer than juniper or al-

* Pages 79 and 475.

† Page 78.

WOUNDS AND INJURIES.

WOUNDS.

The Union of Wounds. (Continued.)

cohol catgut. His method is: chromic acid, one part, water five parts (by weight). To one part of this solution add twenty parts of glycerine, and allow the catgut to remain immersed for seven or eight months. They are then preserved in carbolic acid one part, to glycerine ten (1 to 10). Thus prepared catgut will resist absorption from twenty to sixty days."—"Wyeth's Text Book on Surgery."

FIG. 3861.
Fowler's Antiseptic Ligature
Carrier.



"By means of this little contrivance the gut can be unwound from the spool without handling or removing it from the fluid in which it is immersed. The case can be made of sufficient width to accommodate as many different spools as may be desirable."—"Antiseptic Ligature Spool and Base." By Geo. R. Fowler, M. D.

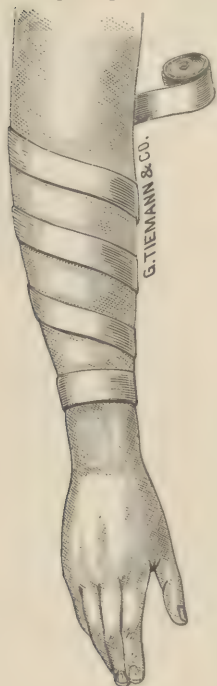
FIG. 3862.
Antiseptic Ligature.



FIG. 3863.
Spools and Jars.

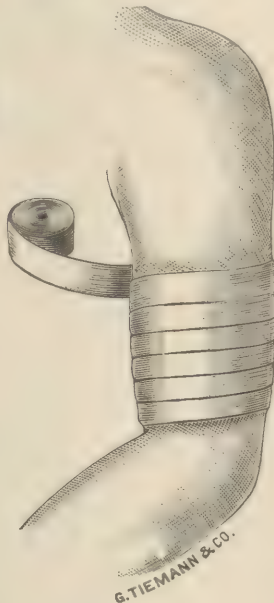


FIG. 3864.
Rapid Spiral.



CIRCULAR.

FIG. 3865.—Slow Spiral.



Bandages.

"To keep the dressings on, to envelope, compress and fix the injured part of the body, bandages are used, and these are made of the following material: *a.* of *linen*—these are best made of old soft linen, which has been frequently washed, and torn or cut according to the thread (bandages of new linen adapt themselves badly, because they are too stiff); *b.* torn from *cotton stuff* (shirting)—these are cheaper than the linen, and especially useful for starch bandages; *c.* from *gauze* (muslin)—these adapt themselves well, if previously moistened, and stick together when dry, because they contain starch; they are especially suitable for the application of plaster of Paris; *d.* torn from *flannel*—these are soft and pliable, and consequently accommodate themselves well to the part; they are especially suitable for placing beneath starch and plaster of Paris bandages; *e.* cut out of *cotton wool*—these are soft and compressible, and are, therefore, in like manner suitable for placing beneath hardening bandages."—"Surgeon's Handbook." Esmarch.

The Bandaging.

"The bandaging must be done with great accuracy and care, for a badly applied bandage easily gets out of place, and by strangulation may produce considerable mischief.

A bandage too tightly applied soon produces venous stasis; the parts below the seat of strangulation swell, become painful, blue and cold, and if the cause be not soon removed gangrene ensues. If bandages, applied dry, afterwards become wet (*e. g.*, from cold wrappings) they shrink, and frequently produce strangulation.

"In bandaging one distinguishes the following passes and turns:

- "1. The *circular bandage*, whose turns are applied on one and the same level (Fig. 3864, *infra*).
- "2. The *rapidly ascending spiral* (*Schlangentour, dolabra repens*) Fig. 3864, *supra*.
- "3. The *slowly ascending spiral* (*Hobelbinde, dolabra ascendens*), whose turns partially overlap each other (Fig. 3865).

The *descending spiral* is seldom used, on account of its driving back the venous blood."—ESMARCH.

WOUNDS AND INJURIES.

WOUNDS.

The Bandaging. (Continued.)

FIG. 3866.

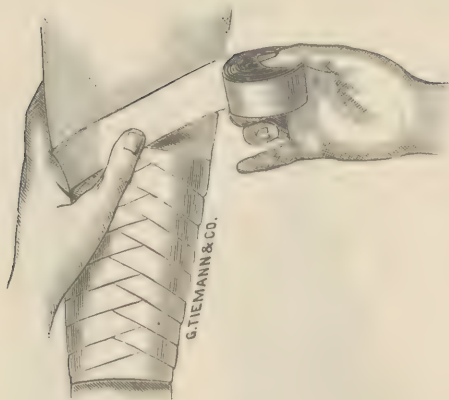


FIG. 3867.

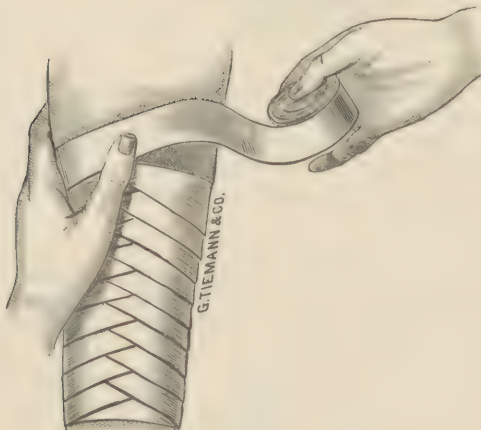
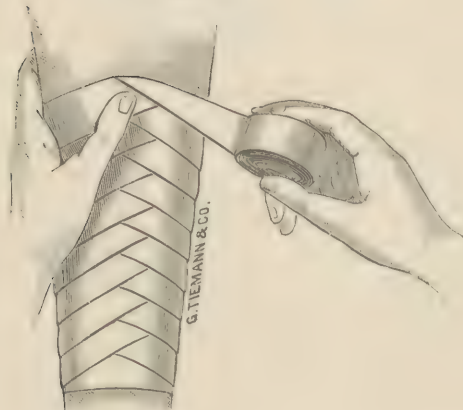
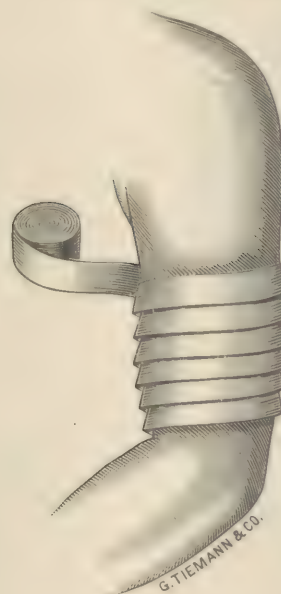


FIG. 3868.



"4. Bandaging by reverses (*dolabra reversa, renversée*), (Fig. 3866, 3867, 3868), must be used when the circumference of the limb increases or diminishes, so as to avoid the gaping of the turns (Fig. 3869).

FIG. 3869.—Gaping Bandage.



"5. The *figure-of-eight (spica)* is employed where the bandage passes over a joint (Fig. 3870).

FIG. 3870.—Spica.



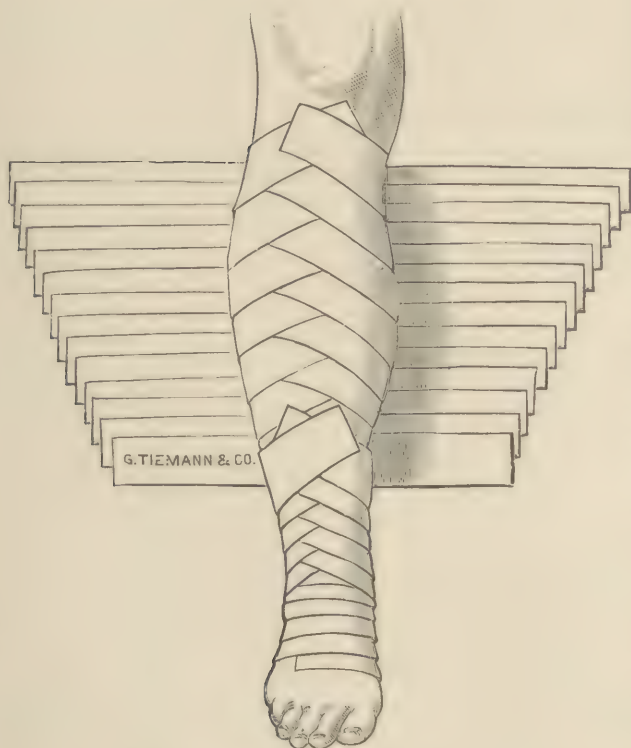
"6. The *double-headed roller*, a bandage which is rolled up from both ends, is used especially for the head, and for amputation stumps; it is also employed for drawing together the edges of wounds.

WOUNDS AND INJURIES.

WOUNDS.

The Bandaging. (Continued.)

FIG. 3871.—The Many-Tailed Bandage.



"7. The *many-tailed bandage*, consisting of many short strips of bandage which overlap each other, is used for compound fractures and sometimes for the application of plaster of Paris. (Fig. 3871.)

"8. The *T bandage*, a strip of bandage, to the middle of which another strip is fastened at right angles, is used in some dressings for the pelvis and head.

The Handkerchief Bandages.

"By means of a linen or cotton cloth, triangular (neck-handkerchief), or square (pocket-handkerchief), most of the dressings can be well applied; little or no practice is required for their application, and there is little risk of strangulation. These bandages are, therefore, well fitted for military practice, and, before every thing else, for the first assistance on the battlefield."—"The Surgeon's Handbook."* Dr. Friedrich Esmarch, Surgeon-General, Prussian Army.

THE HARDENING BANDAGES.

I. Starch Bandage

was invented by Seutin, in 1840.

"1. *Preparation of Starch Paste*.—Starch is stirred with cold water to a uniform, cream-like consistence, and then, whilst constantly stirring, as much boiling water is added as will produce a clear, thick mucilage.

"2. *Starch Bandages* are strips of shirting, which are drawn through the fresh paste and rolled up into bandages.

"3. *Starch Splints* are made of strips of pasteboard, which are drawn once quickly through hot water, and then thickly smeared on both sides with the paste.

"4. *Application of the Starch Bandage*.—The limb is very carefully bandaged with a moist flannel roller, after the recesses about the joints have been padded with cotton wool. A starch bandage is then applied, on which the soft starch splints are laid, and these are firmly bandaged on with a starch roller. Finally the whole is enveloped with a dry calico, cotton or gauze bandage.

"5. Strips of paper can be used instead of the bandages. They are drawn through the paste, and applied after the method of Scultet's bandage (many-tailed).

"6. *Burggrave's Method* of cotton wool and pasteboard is very simple and practical. Pasteboard splints are cut to the shape of the limb, then covered on one side with paste and on the other with a layer of cotton wool; the splints are applied with the cotton wool next the limb, and firmly bandaged on with a dry gauze roller—in doing which one begins with the quickly ascending spiral, in order only first to fix the splints to the limb. Over the gauze bandage is rubbed with the hands, or a large brush, an abundance of starch paste, and lastly the whole is covered with a dry calico bandage.

"7. Two or three days elapse before a starch bandage is *quite dry and hard*. By exposing it to the heat of the sun or a stove, its drying can be hastened.

"8. To render it *capable of removal*, the bandage is cut open throughout its whole length with a strong pair of scissors and the casing bent asunder, while strips of calico bandage are pasted on the edges of the starch. The casing is then re-applied and fastened with straps and buckles."—"The Surgeon's Handbook." Esmarch.

* Having illustrations printed on the triangular handkerchiefs, describing their application for injuries of different parts of the body. *Vide* Esmarch's "The First Dressing on the Battlefield." Translated by Dr. Thomas Guy. Kiel: 1869.

WOUNDS AND INJURIES.

THE HARDENING BANDAGES. (Continued.)

II. The Silica (Wasserglas) Bandage.

"1. Soaked in a concentrated solution of silicate of potassium, which must have a specific gravity of 1.35—1.40 (Böhm), bandages can be produced which become perfectly firm and hard as soon as the water has evaporated.

"2. *To hasten its stiffening*, finely pulverized chalk, or slaked lime and chalk (1.10, Böhm), magnesite (König), or cement (Mitscherlich), is stirred in the silica till a cream-like fluid is produced, in which the bandages are dipped or with which the bandages are smeared, after their application, by means of a large brush. Lastly the whole bandage is sprinkled with the dry powder and well rubbed."

III. The Gutta Percha Bandage.

"Splints are cut out of gutta percha, two to three millimetres thick, and dipped in hot water at 60° R. till they become quite flexible; they are then applied to the limb, which has been previously enveloped with a wet flannel roller, and firmly bound on with gauze bandages. By pouring cold water over them they quickly become hard."

IV. The Plaster of Paris Bandage

was invented by Mathysen, in 1852. It has this advantage over all others, that it becomes hard and firm in the shortest time.

"1. *Mixing the plaster of Paris* is best done in a porcelain dish, about so much water being poured upon a sufficient quantity of plaster, whilst constantly stirring, as to reduce the paste to the consistence of thick cream. It stiffens in five to ten minutes to a solid mass.

"2. Should it be desirable to *delay the setting* of the plaster, more water is added, or some starch, size, milk, beer or borax is mixed with the water.

"3. If the *setting is to be hastened*, less water or hot water is used, or some common salt, alum, silica or cement powder is added to it.

"4. If the *plaster has deteriorated* by absorption of water from the atmosphere, it can be again made serviceable by heating it in an open pan till it no longer gives off steam.

"5. The *application* of the plaster of Paris bandage can be carried out in various ways.

"6. Strips of bandages are dipped in the plaster cream, and placed after *Scultet's* method (many-tailed) around the limb, which has been previously smeared with oil or lard.—ADELMANN.

"7. *Old clothes* (woolen stockings, drawers, vests, &c., or coarse sack-cloth) can be cut up and used instead of bandages, as they readily absorb the plaster-cream.—PIROGOFF.

"8. The *Bavarian splint*.—Plaster-cream is poured between two pieces of linen or calico, which is stitched together down the middle and the limb enveloped in it. As soon as the plaster has set, the two halves, which are connected together by the stitching, can be opened and the injured parts exposed (*amovo-inamovibel*).

"9. Out of *bundles of hemp, flax or jute*, which are dipped in plaster of Paris and bandaged to the limb (previously oiled) with flannel rollers, removable plaster splints can be quickly produced (Beely); they are well fitted for fixing compound fractures, which are being treated on the antiseptic method. If it be desirable to suspend the limb with such a splint, rings or loops of telegraph wire can be placed in many places between the bundles of hemp and fixed by the plaster.

"10. *Bandages can be impregnated with dry plaster of Paris*, and then soaked in water for a short time before their application. The gauze bandages are the most suitable for this treatment. The gauze bandages are impregnated in the simplest manner, by putting the end of the bandage through a slit in an upright board, in front of which the plaster of Paris is placed; the bandage is then rolled up with the fingers.

"11. The plaster bandages and the powder can be kept together in a tin case, and separated from one another by the board mentioned above.

"12. The gauze bandages can also be quickly impregnated by means of a machine.

"13. As an application beneath the plaster of Paris bandages, *cotton wool* can be suitably employed, as it is the best means of averting pressure and strangulation.

"14. Moistened gauze bandages (Roser), or dry flannel rollers, can also be employed for the same purpose in compound fractures, as well as flannel or gauze bandages soaked in carbolic oil (10 per cent.); the latter do not easily become impregnated with the secretion from the wound.—BARDELEBEN.

"15. To make the edges of the plaster of Paris bandage smooth and even, the bandage beneath, which projects somewhat, can be turned over like a frill and fixed by a turn of the plaster of Paris bandage.

"16. To make the plaster of Paris bandage stronger, a layer of the plaster-cream can be smeared over the bandage. But it will thus become very thick and heavy.

"17. To give it greater firmness, it is better to introduce *shavings, wooden splints or iron wire*, as they last longer and can be easily removed.

WOUNDS AND INJURIES.

THE HARDENING BANDAGES.

The Plaster of Paris Bandage. (Continued.)

"18. Lastly, should it be desirable to give the bandage a neat and smooth surface, some dry plaster is sprinkled over and rubbed by the hands moistened with water.

"19. Where there are wounds, openings (windows, *fenestra*) must be made in the plaster, by which the secretion from the wound may have a free escape. These are either left open at the time of application of the bandage, or the window is afterwards made with the assistance of a short knife and a pair of scissors.

"20. In order that the places may be found where the windows have to be cut, a ball of cotton wool is placed upon the wound; this afterwards forms a nut-like prominence, upon which an incision can be made with confidence.

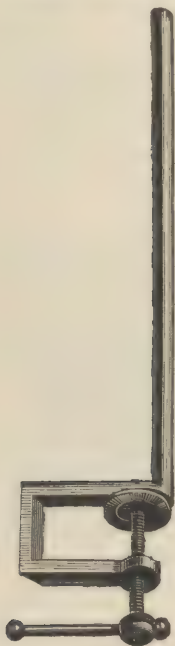
"21. To prevent the entrance of pus between the skin and the plaster bandage, the windows must be smeared all around their edges with carbolized cement, or filled with cotton wool soaked in collodion.

"22. If it is necessary to make the plaster of Paris *waterproof*, it must be saturated with a solution of *damar resin* in ether [(1:4) damar varnish] by means of a brush.

"23. For extensive wounds, a plaster of Paris bandage is only applied above and below the injured part, and the two united by means of laths, which are placed upon pads of tow soaked in plaster-cream; these are connected with the apparatus by plaster of Paris bandages."—"The Surgeon's Handbook on the Treatment of Wounded in War." Dr. Friedrich Esmarch.

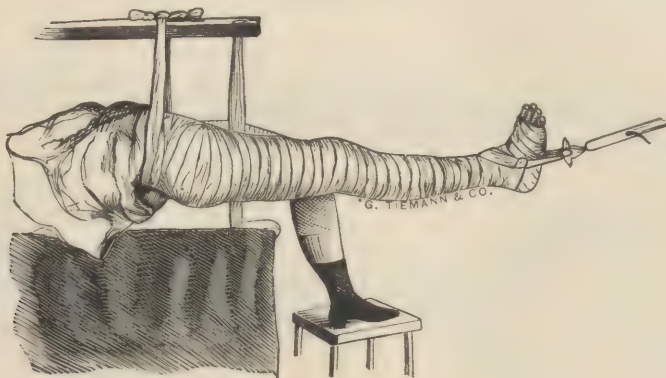
Application of Plaster of Paris Dressings.

FIG. 3872.
Stanchion for
Counter Extension.



"The following is the usual mode of applying this dressing at Bellevue: The patient is placed with his nates overhanging one corner of a table, or with his body, shoulders and head resting upon a mattress elevated by blankets about one foot from the table, but terminating about two feet from its lower end. The perineum is pressed against an iron stanchion, which is firmly screwed upon the lower end of the table and wound with heavy flannel cloth. The nates are then suspended by a sling which passes under the small of the back, and which is supported by a wooden bar projecting horizontally from the top of the stanchion to some point of support of equal elevation beyond the head. Compound pulleys are now attached to the foot, and the exhibition of the anæsthetic commenced. In some cases, as is represented in Fig. 3873, a plaster of Paris bandage is first applied to the foot and lower portion of the leg an hour or two before the fracture is reduced, and when this has become hard the extension is applied. The patient being fully under the influence of the anæsthetic, traction is made upon the pulleys until the shortening is supposed to be overcome and the fracture reduced. The direction of the extension must be in the line of the axis of the body, it having been observed that when the plaster is applied with the limb abducted too much pressure is brought upon the perineum when the limb is again dropped into line; and if the limb is abducted when the plaster is applied, the dressing will be too loose about the groin in the straight position. The bandages, saturated with plaster, are applied over the whole limb, from below upwards, including the pelvis. Occasionally the successive turns of the roller are reinforced by broad pieces of flannel or of patent lint, dipped in the fluid plaster. The number and thickness of the successive layers must be determined by the apparent necessities of the case, generally four or five

FIG. 3873.

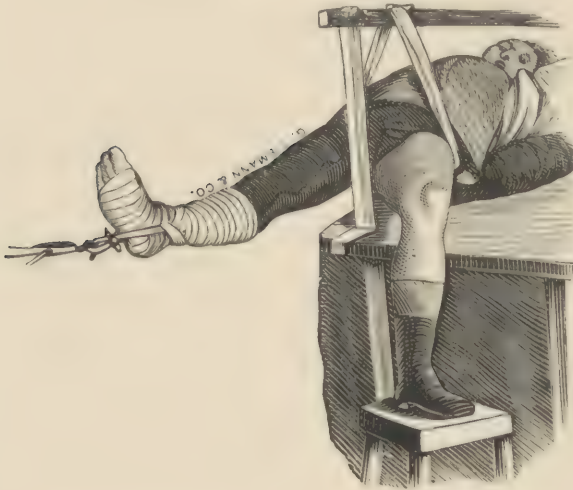


WOUNDS AND INJURIES.

THE HARDENING BANDAGES.

Plaster of Paris. (Continued.)

FIG. 3874. (As applied at Bellevue.)



layers of roller being required, at least upon the thigh. I have omitted to state that excoriations caused by the dressings have been noticed most frequently in the groin and gluteal fold; this may, however, be avoided by placing a heavy piece of dry flannel over these parts previous to the application of the plaster. The dressing being completed, the extension is continued fifteen or twenty minutes until the plaster has become hard.

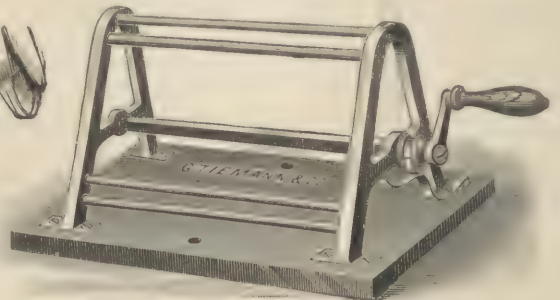
"In case the plaster was not applied to the foot and lower portion of the leg prior to the dressing of the fracture this may now be done, or the patient may be laid in bed and permitted to recover from the influence of the anæsthetic before completing the dressing. On the second or third day, after the reduction of the fracture, most of our patients have been permitted to go about on crutches; a practice which, although it seems to be attended with certain hazards, possesses at least this advantage, that it enables the patient to preserve his general health. It is not

improbable, also, that it prevents that atrophy and shrinkage of the limb which would otherwise ensue, and which, when it occurs, renders it necessary to open and readjust the dressings."—"Principles and Practice of Surgery." F. H. Hamilton.

FIG. 3875.—Roller Bandage.



FIG. 3876.—Tiemann & Co.'s Bandage Roller.



"24. The plaster of Paris bandage is most *easily removed* by cutting a deep groove with a very short thick knife, and then dividing the deep layers at the bottom with a strong pair of scissors (Fig. 3878)."

Fig. 3877.—Esmarch's Bandage Knife.

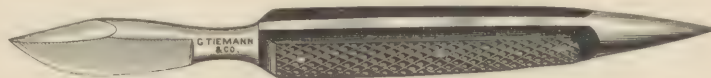
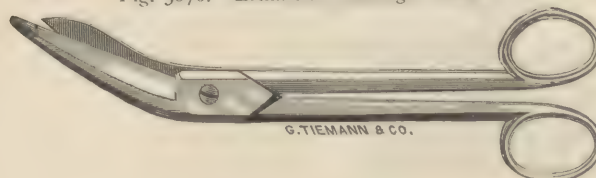


Fig. 3878.—Esmarch's Bandage Shears.



To facilitate the removal
of Plaster of Paris
and Starch Bandages.

"The Surgeon's Hand-
book on the Treatment of
Wounded in War." Dr.
Friedrich Esmarch.

WOUNDS AND INJURIES.

BANDAGE SHEARS.

To Facilitate the Removal of Plaster of Paris and Starch Bandages.

FIG. 3879.—Henry's Bandage Shears.

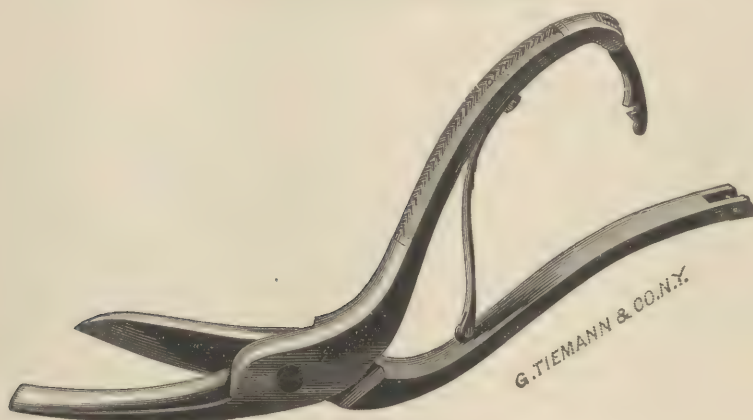


FIG. 3880.
Wackerhagen's
Bandage Shears.



FIG. 3881.—Szymanowsky's Bandage Shears.



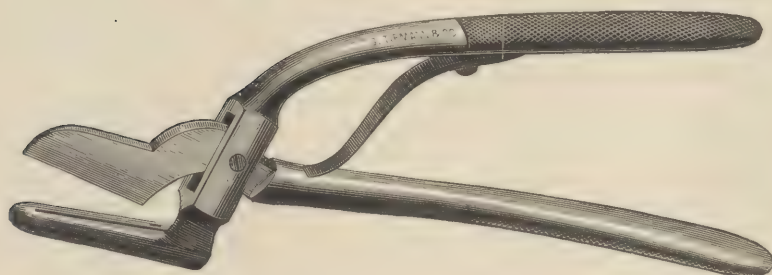
FIG. 3882.
Wight's Bandage Shears.



FIG. 3883.—Brun's Bandage Shears.



FIG. 3884.—Sayre's Bandage Shears.



WOUNDS AND INJURIES.

FRACTURE.

"Fracture: the breaking of a bone."—WEBSTER.

"A *simple fracture* is when the bone is divided. A *compound fracture* is a division of the bone with a wound of the integuments communicating with the bone—the bone, indeed, generally protruding. In a *comminuted fracture* the bone is broken into several pieces; and in a *complicated fracture* there is, in addition to the injury done to the bone, a lesion of some considerable vessel, nervous trunk, &c., according to their direction. The *treatment of fractures* consists, in general, in reducing the fragments when displaced; maintaining them when reduced; preventing the symptoms which may be likely to arise; and combating them when they occur. The reduction of fractures must be effected by *extension*, *counter extension*, and *coaptation*. The parts are kept in apposition by position, rest and an appropriate apparatus. The position must vary according to the kind of fracture. Commonly the fractured limb is placed on a horizontal or slightly inclined plane, in a state of extension; or rather in a middle state between extension and flexion, according to the case."—DUNGLISON.

"The *reparative power of bone* is of the greatest importance in surgery. When a bone is broken, blood is effused, with the coagulum of which a semi-transparent lymph is subsequently mingled, covering the surfaces of the wounded parts; in the course of two or three weeks this is gradually condensed by an interstitial change, which converts it into substance resembling temporary cartilage; ossification takes place in this in a nearly uniform manner, and the whole is transformed in from four to six weeks into a spongy osseous mass which holds the ends of bone together; this provisional callus, as Deputyren called it, is gradually absorbed during the succeeding months, while the permanent callus has all the characters of new bone. When this reparative process is interfered with by meddling surgery or constitutional disease, the union takes place merely by ligament, constituting sometimes a false joint."—"American Cyclopædia."

FRACTURE APPARATUS.

"Before an attempt be made to set the fracture, it is necessary to provide the requisite apparatus for effecting its maintenance. The means which are employed for the purpose are *splints*, *cushions*, *bandages* and *adhesive strips*. *Splints* are made of various materials, as wood, trunk-board, leather, felt, gutta percha, tin, wire and iron, according to the nature of the fracture, or the fancy, whim or caprice of the practitioner. In fracture of the thigh and leg, especially in that form which requires permanent extension and counter extension, the best article is wood. In fracture of the superior extremity, particularly of the humerus and of the bones of the forearm, splints made of trunk-board generally fulfil every indication, as by a little manipulation, after immersion in hot water, they may easily be moulded to the form of the limb. A piece of thick pasteboard affords a good support to a broken jaw or finger. Unhoiled sole leather and gutta percha make excellent splints. Previously to applying them, they must be softened in hot water, the sharp angles and edges having been pared off with a knife. The tin case is employed a great deal, especially in fracture of the humerus at the elbow and of the tibia at the ankle. Iron splints, in the form of a double inclined plane, are sometimes used; and very good splints may be made of light wire and of perforated zinc. For fractures of the bones of the hand and fingers curved splints are very serviceable.

"Felt splints, adapted to the different regions of the body, and put up in portable cases, have of late years been a good deal employed; they are very light and flexible, are not affected by cold or warm water dressings and are easily moulded to every inequality of the surface of the parts to which they are applied."

Plaster Splints.—See HARDENING BANDAGES, page 571.

"*Adhesive plaster*, cut into suitable strips, is now universally employed in this country as a means of making extension, in the treatment of fractures of the lower extremity, and nothing, certainly, could generally answer a better purpose. * * *

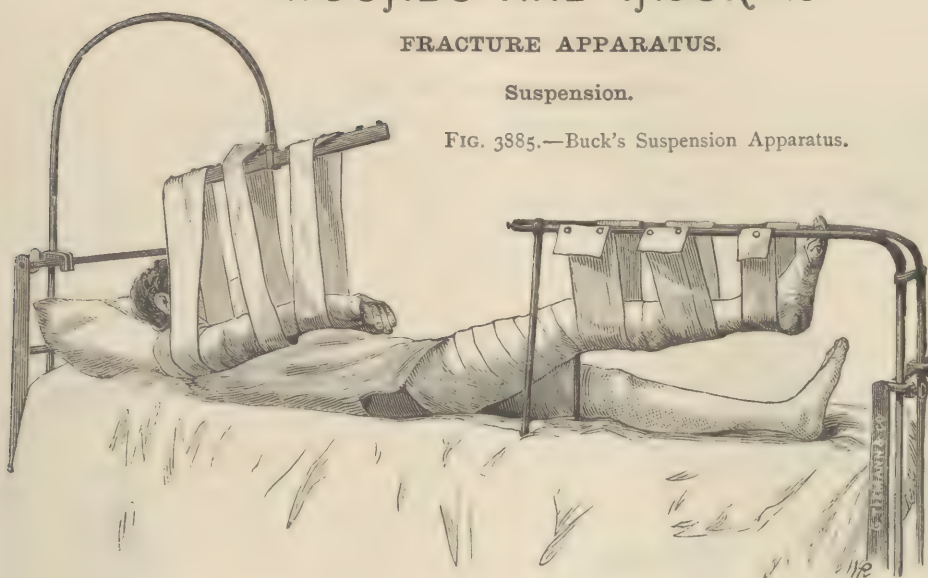
"*Extension and counter extension* are always necessary in oblique fractures of the extremities attended with displacement. By the term extension is understood the force which is required to draw the upper end of the lower fragment to a level with the lower end of the upper fragment, in order to place them in their natural relations; by counter extension, on the contrary, is implied the resistance which is employed to prevent the limb, or even the body, from being dragged along by the extending power. The extension is generally made upon that part of the limb which is articulated with the lower piece, and the counter extension upon that which is articulated with the upper. Thus, for example, in fracture of the shafts of the bones of the forearm, the extending power acts upon the hand, and the counter extending power upon the arm, while in fracture of the body of the humerus the two forces are respectively exerted upon the forearm and the chest; and so in regard to fracture of the inferior extremity. When but little muscular resistance is anticipated, as in a child or feeble person, the extension and counter extension may be applied directly to the two fragments, but at as great a distance from the seat of the injury as practicable. On the whole, however, the former method is decidedly preferable, as it is much less likely to irritate and worry the muscles."—"System of Surgery." Gross.

WOUNDS AND INJURIES.

FRACTURE APPARATUS.

Suspension.

FIG. 3885.—Buck's Suspension Apparatus.



Buck's apparatus (Fig. 3885), for suspending the upper limbs, is made of iron tubing; its upright portion is fastened by clamps at the head of the bedstead and its lower portion overhangs the bed and holds suspended at its extremity a flattened strip of hard wood, on the upper edge of which a row of screw-heads serves for fastening the ends of the canvas bands that suspend the limb. The strip of wood that supports the limb plays horizontally on a swivel-joint at the extremity of the iron tubing. For suspending the lower limbs five-eighth inch iron tubing is bent, in the manner shown by the picture. The horizontal portion overhanging the bed is supported by two upright iron rods resting upon the mattress astraddle of the thigh. A row of screw-heads inserted along the outer surface of the horizontal portion serves for fastening the ends of the canvas bands that suspend the limb. The upright portion of the apparatus is securely fastened to the two cross-rods at the foot of the bedstead by clamps, and can be adjusted at any required height. The suspending bands are of stout sail-cloth canvas, cut of any required length and width, and buttoned on to the screw-heads by slits cut for the purpose. The canvas being very strong does not tear, and will sustain any weight it has to bear.

Adaptable Porous Felt Splints.

The manufacturer claims: They have been tested extensively in both civil and military practice for a number of years, and have been indorsed and recommended in the most unqualified manner by the most distinguished surgeons of America. Their *porosity* allows the free application of cold or warm water dressings; they permit passive motion by their *flexibility*; they are perfectly adapted to the contour of the limb, and hence promptly relieve the pain caused by unadjusted fragments; and as they are also light, soft, odorless, durable, and, finally, the *cheapest ever put in the market*, they seem to fill the ideal of a surgical splint as closely as can be imagined. The splints are made of a tough, flexible material, about as thick as heavy binder's board, and are moulded to the perfect form of the limbs, over models. They can be *adapted*, at will, to limbs of various sizes by immersing the splint in boiling water and then fitting it to the part, which is protected by muslin cloths saturated with cold water. They are, however, not in the least injured, nor is their consistency altered by the continued application of water, as hot or cold as the skin can bear. Their *flexibility* enables them to accommodate themselves to the increase or reduction of the swelling, and by exerting a gentle and equable pressure to hasten its disappearance. When once fitted to the limb they are not easily displaced or loosened. The patient can move about and change his position without pain or injury, while the muscular structure in the fractured limb is maintained in perfect quiet. Hence, they are invaluable when persons with serious fractures have to be transported long distances, and also when the general health will suffer from confinement to bed. It is one of the most satisfying proofs (both to physician and patient) of the perfection of these splints, to witness how promptly the pain disappears when the fractured limb is snugly encased in them. There is no necessity to wait for hours or days till the inflammation is passed, as is sometimes recommended. Nor is the physician exposed to the impertinent interference of officious outsiders in loosening bandages and disarranging the fracture on the plea of relieving pain.

FIG. 3886.—Lower Maxillary Splints, No. 1.



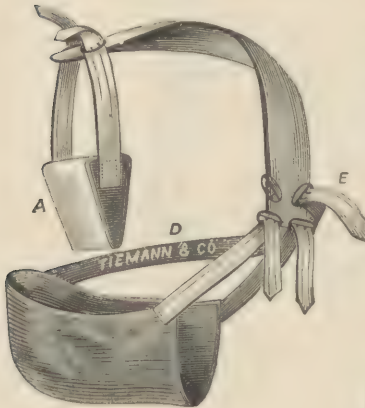
Splint No. 1 embraces the entire chin and forms a complete support to the fractured part, while at the same time it allows, by its flexibility, sufficient motion to open the mouth slightly for food. They are more comfortable than the gutta percha splint. Retain it by Barton's bandage.

WOUNDS AND INJURIES.

FRACTURE APPARATUS.

Adaptable Porous Felt Splints.

FIG. 3887.
Fox's Clavicle Splint. No. 2.



This frequent injury (fracture of the clavicle) will be most satisfactorily treated by Levi's modification of Fox's apparatus, shown by Fig. 3887. This consists, in brief, of a trough for the forearm, an auxiliary pad and a broad strap over the sound shoulder. We supply the trough, perforated at the proper points for the attachment of the necessary straps. The rest of the apparatus can be readily improvised.

FIG. 3888.
Shoulder Splint. No. 3.

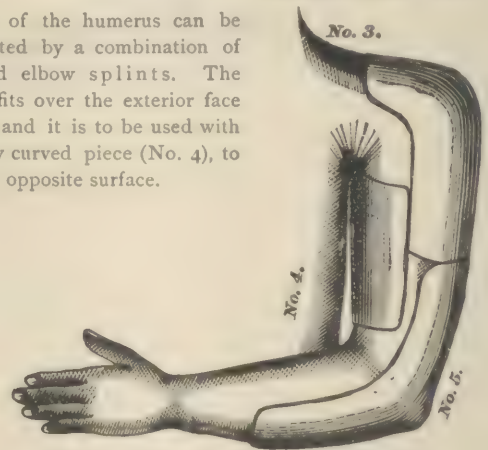
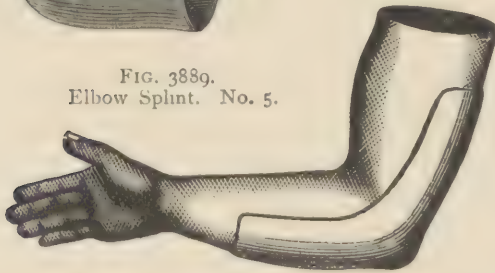


FIG. 3889.
Elbow Splint. No. 5.

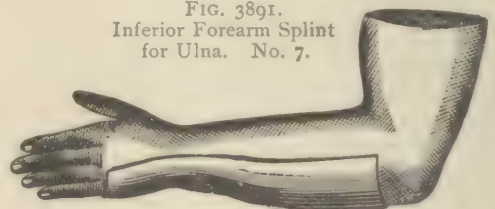


No. 5 is for fractures and dislocations of the radius, ulna and humerus at or near the elbow-joint. In combination with the inferior and superior forearm splints, it is adapted to all fractures of the ulna and radius, at the middle or upper third, or compound comminuted fractures of the same bones. Where both radius and ulna are fractured, bring the parts into contact, then apply splints Nos. 3, 4, 5, 6, 7, and bandage over all from the hand to the shoulder. If the fracture is comminuted, cut a part or parts out of the splints corresponding to the points of comminution, and bandage around them. The wounds can easily be dressed without disturbing the splints or bandages. As the swelling is reduced, tighten the bandages, as the splints accommodate themselves to the reduction. The elbow splint is at an obtuse angle, to prevent the lapping of soft parts, and as being most natural to sling.

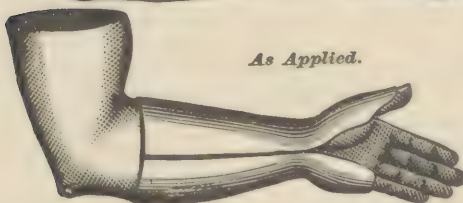
FIG. 3890.
Superior Forearm Splint for Radius.



FIG. 3891.
Inferior Forearm Splint for Ulna. No. 7.



As Applied.



These two splints (Figs. 3890 and 3891) are intended for all fractures of the forearm, and also for sprains and dislocations at the wrist-joint, complicated or not with fracture. Very often actual fractures of the head of the radius or ulna are diagnosed as sprains, and result in semi-ankylosis. These cases, even when of several months' duration, can be reached with complete success with these splints. They are also admirably

adapted to treating Barton's fracture, fulfilling every indication, requiring no pads or compresses, and being less likely to be followed by stiffness of the joint; they may be used either in combination or alone. As the radius and ulna are more liable to fracture than any other bones, ready made splints are very convenient.

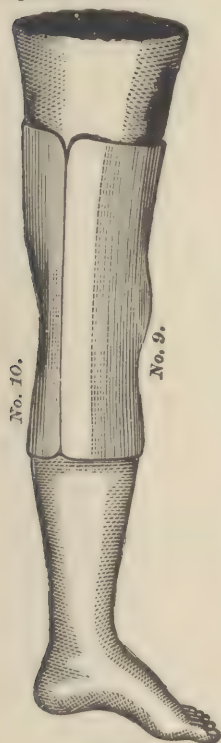
WOUNDS AND INJURIES.

FRACTURE APPARATUS.

FIG. 3892.
Femoral Splints,
No. 8.



FIG. 3893.
Anterior and Posterior
Knee-Joint
Splints. Nos. 9, 10.



Adaptable Porous Felt Splints.

These splints are intended to treat fracture of the lower third and middle of the femur and upper third, in combination with anterior and posterior knee-joint splints, as represented in Nos. 9 and 10. They encase the fractured limb perfectly. These *splints* are also intended, and admirably suited, for the treatment of fracture of the ribs and hip-joint.

No. 9 splint is adapted to treat fractures of the tibia, fibula and femur near the joint, and also, in connection with the anterior and posterior tibia and fibula splints, to treat all fractures of those bones. There are two splints to each set—one for the right and one for the left knee-joint.

The No. 10 splint, in connection with anterior knee-joint splint, treats fractures of the tibia, fibula and femur near the knee-joint, and also the upper third of the fibula and tibia, and the lower third of the femur; and also, in connection with the anterior and posterior tibia splints, treats all fractures of those bones. There are two splints to each set—one for the right and one for the left limb. These splints can be used for the tibia and fibula also, when fractured about the middle of the shaft. Nos. 9 and 10 are used also for fracture of the patella, and are admirably adapted to keep it in position.

No. 11 splint is intended for fractures of the tibia proper, and especially for fractures, either simple or compound, in the vicinity of the ankle-joint. It reaches from the knee-joint to the instep and embraces the ankle-joint perfectly. Fractures of the malleoli will be readily treated by combination of this and the following piece. There are two splints of this kind to each set.

No. 12 splint is suited to treating fractures of the fibula proper, and also in the vicinity of the ankle-joints, either simple, compound or comminuted. Nos. 11 and 12 are combined for a complete apparatus for treating compound fractures of the tibia and fibula, either in the upper, middle, or lower third, and at the ankle-joints. There are two splints to each set—one for the left and one for the right limb.

No. 13 splint is intended for treating the club-feet of children, after operation or without operation, which it does very successfully. There are two club-foot splints for each set. If the application of these splints be commenced soon after birth, where this deformity is present, and so adapted (by the foot being bent sidewise, at an angle to the leg portion) that they exert a constant yet moderate pressure toward the normal line of the limb, the deformity may, in some cases, be remedied without an operation.

FIG. 3895.
Club-Foot Splints
for Children.
No. 13.



FIG. 3894.
Anterior and Posterior
Fibula Splints.
Nos. 11 and 12.

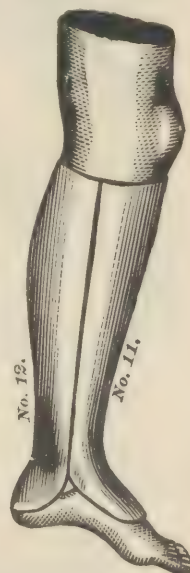
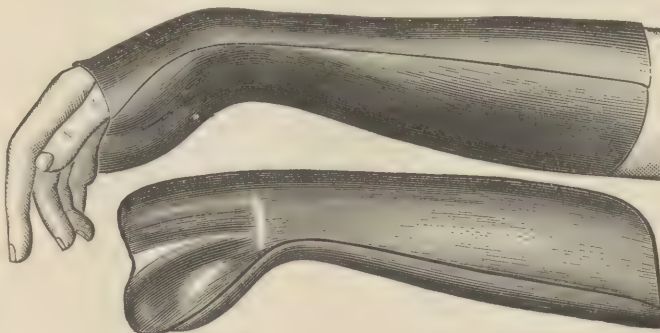


FIG. 3896.—Levis' Radius Splint,
for Fracture of the Lower End of the Radius.



Levis' Radius Splint is made of *Johnstone's Improved Adaptable Porous Felt* and possesses all the admirable qualities and indications of our regular Johnstone's Improved Ahl's Splints. They entirely obviate the necessity of compresses or pads, and insure extension and position. The price of the splints is \$2 a pair, or \$1 for a single piece.

WOUNDS AND INJURIES.

FRACTURE APPARATUS.

Levis' Metallic Splints,

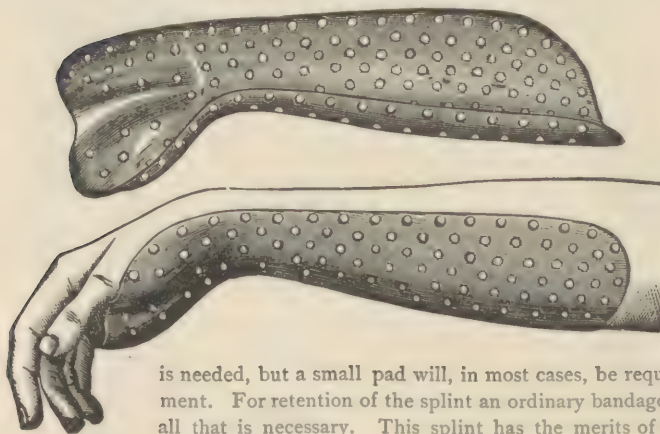
designed by R. Levis, M.D. They are flexible, perforated, nickel-plated, and conformable to every size and condition of limbs.

The copper used in the manufacture of these splints, being less than *one-eightieth* of an inch in thickness, makes them *very light* and readily conformable by bending so as to suit the peculiarities of any limb, and yet the splints when applied are as firm as the heaviest wooden appliances. They fit so accurately that but little padding is required; a piece of woven lint, or of cotton or woolen flannel, is all that is necessary for their lining. A slight roughness is left on the outside of the splints, by perforations, to prevent the bandage from slipping. They are nickel-plated, to prevent oxidation. They are *invaluable* when the parts are lacerated, as the *perforations allow ventilation, and secretions are not confined and liable to be absorbed, as in many other kind of splints*, but readily pass off through the numerous orifices. These splints are cooler, lighter in weight, thinner in material, more correct in shape and more perfect in fit than any other splints offered to the profession. They are all made in two sizes—one size for adults and one for children—and all, except the radius, fit the same on either the right or left limb. The following comprise a complete set, and are ample

to apply to any fractures that may occur.

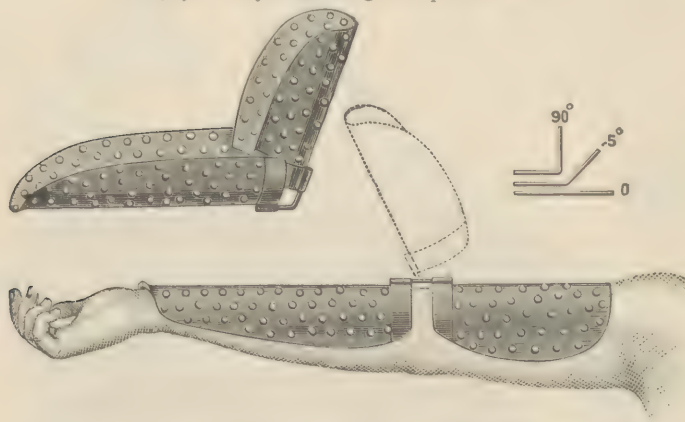
In the treatment of fracture of the lower end of the radius it is essential that proper allowance be made for the curvature of the anterior or palmar surface of this part of the bone. This is insured in this splint, which follows correctly the radial curvature; and the fixing of the thenar and hypothenar eminences of the hand in their moulded beds maintains the splint immovably in its correct position with reference to the radial curve. To neglect of complete primary reduction of the displacement of the lower fragment, and to inefficient restoration and retention of the normal radial curve, are due the frequent unfortunate sequences of this fracture. No dorsal splint

FIG. 3897.—Levis' Radius Splints, Right and Left, for Fracture of the Lower End of the Radius. No. 1.



is needed, but a small pad will, in most cases, be required over the dorsal surface of the lower fragment. For retention of the splint an ordinary bandage, two inches and a half to three inches wide, is all that is necessary. This splint has the merits of being applicable to all cases of fracture of the lower end of the radius, and also to many other injuries involving the forearm and wrist.

FIG. 3898.—Adjustable Angular Splint. No. 2.



This splint can be applied either anteriorly or posteriorly, and is conformable and adjustable to any angle. The pieces are detachable and can be used separately.

This splint is applicable for all fractures of the elbow-joint and of the arm and forearm, excepting those of the lower end of the radius; also to diseases and to resections of the elbow-joint.

Two in each set; price, \$1.50 each.

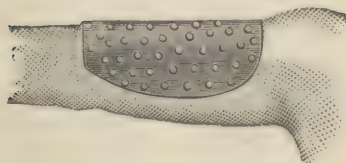
"*Coaptation and dressing*, to restore the broken pieces to the original situation or, to use the common expression, to set the fracture, may be done aided by extension and counter extension. The former will usually suffice in fracture of the upper extremity, the jaw and nose, while the latter will generally be required in fracture of the thigh and leg" (page 582).

WOUNDS AND INJURIES.

FRACTURE APPARATUS.

Levis' Metallic Splints.

FIG. 3899.
Humerus Splint. No. 3.



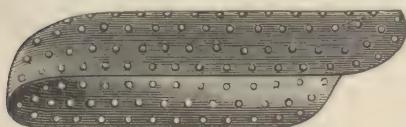
For fractures of the humerus.
Two in each set.
Price, 50 cents each.

FIG. 3900.
Phalanges Splints. No. 4.



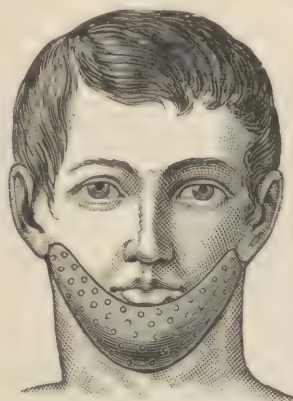
For fractures of the fingers or toes.
Three in each set.
Price, 15 cents each.

FIG. 3901.—Clavicle Splint. No. 5.



This splint forms a cap for the shoulder, and can be applied to fractures of the clavicle and humerus.
Two in each set. Price, 75 cents each.

FIG. 3902.—Maxilla Splint. No. 6.

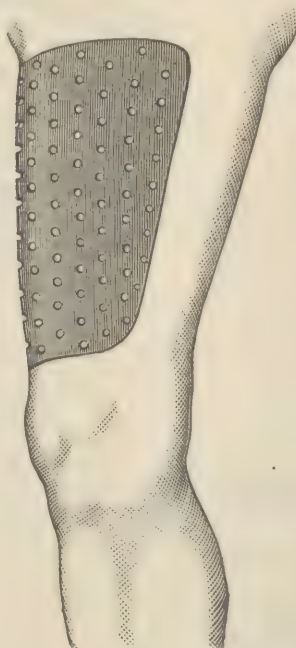
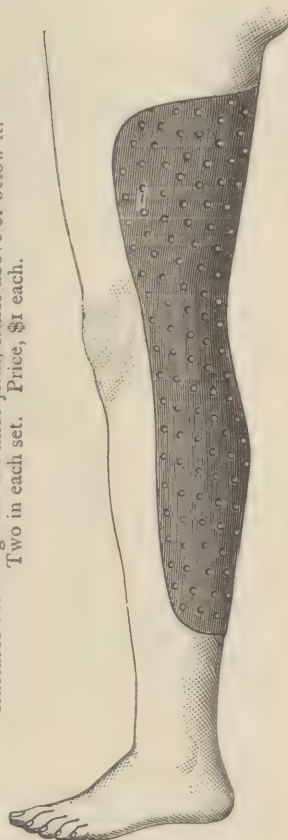


This splint forms a complete cap or covering for the entire chin and lower maxillary bones, and keeps the fractured parts rigidly in the correct position.

Two in each set. Price, 75 cents each.

FIG. 3903.—Femur Splint. No. 7. FIG. 3905.
Tibia and Fibula Splint. No. 9.

FIG. 3904.—Patella Splint. No. 8.
This splint can be applied to all fractures from middle of femur to middle of tibia and fibula, and is particularly well adapted for fractures of the patella and all other fractures occurring near the knee-joint, either above or below it.
Two in each set. Price, \$1 each.



For fracture of the femur, ribs and hip-joint.
Two in each set.
Price, 50 cents each.



For all fractures and other injuries of the leg below the knee, and especially adapted for those at or about the ankle joint.

Two in each set. Price, \$3 each.

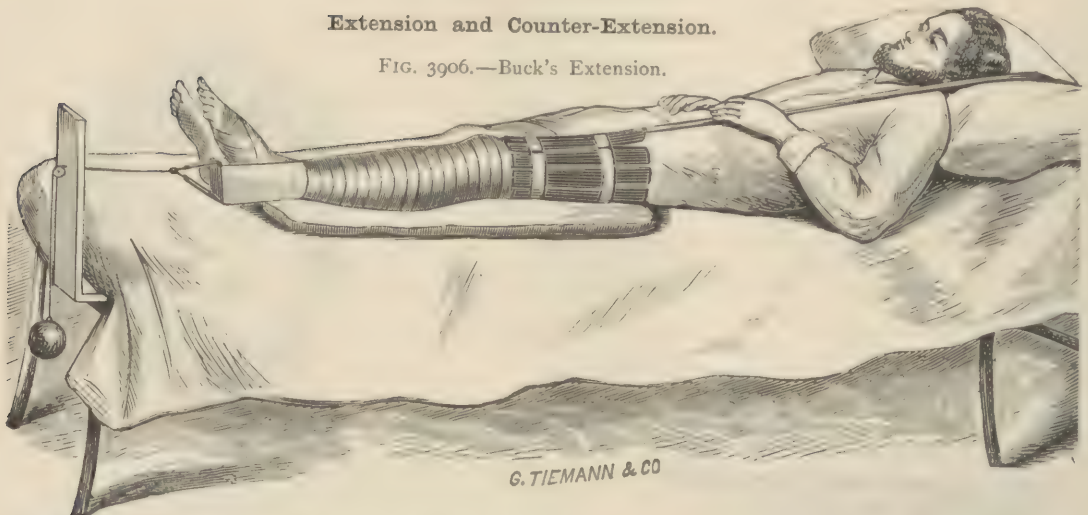
The complete set consists of the twenty-one pieces just described, in a neat, compact case. Price, \$15 per set.

WOUNDS AND INJURIES.

FRACTURE APPATATUS.

Extension and Counter-Extension.

FIG. 3906.—Buck's Extension.



Consists of: 1st. Two bands of heavy adhesive plaster, to which are attached the necessary buckle and elastic webbing. 2d. A perineal band, for counter extension, made of heavy rubber tubing, with straps, buckles and rings. 3d. Four guttered coaptation splints, leather covered; three elastic straps with buckles for fastening the same. 4th. One pulley, one bag for shot and some strong fishing line.

FIG. 3908.—Perineal Band.

FIG. 3907.—Adhesive Plaster and Webbing.

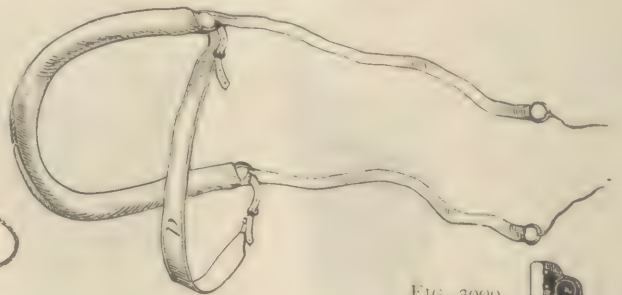
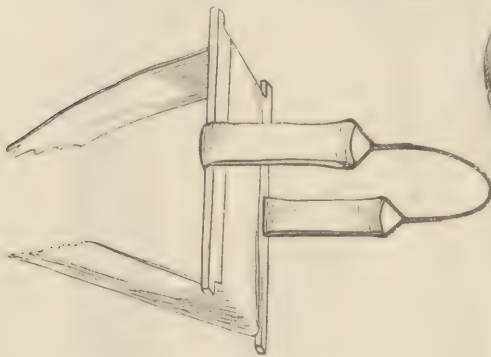


FIG. 3909.

This form of upright, made of wood, may be adapted to any ordinary bedstead. A modification suited to iron bedsteads is represented in Fig. 3911.

The sooner the limb is put up and subjected to this method of treatment after the fracture, the better. Suffering is prevented, and the sufferer made comfortable from the outset. The amount of weight to be employed must be determined by the resistance to be overcome and the toleration of the patient.

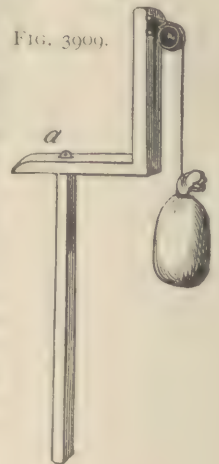
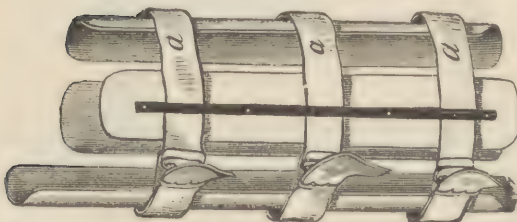


FIG. 3910.—Coaptation Splints.



Mode of Application of Buck's Extension.

A roller bandage, commenced at the toes in the usual way, is continued to the ankles, where it is temporarily arrested. The band of adhesive plaster is then applied so that its middle forms a loop below the sole of the foot, and its ends extend on either side in immediate contact with the limb from the ankles upward. Over this the bandage is continued

WOUNDS AND INJURIES.

FRACTURE APPARATUS.

Extension and Counter Extension. (Continued.)

as high up as the plaster, which stops at the seat of fracture. To allow the application of lotions to the thigh during the first few days of treatment, the end of the adhesive bands should stop short at the condyles of the femur and be turned down. Subsequently they may be replaced, and the bandage continued up on the thigh preparatory to the application of the coaptation splints, which are to be added at this stage of the treatment.

The wooden block is next to be interposed transversely within the loop below the sole of the foot, the rubber band applied around it, and the cord attached as in Fig. 3911. The limb being thus prepared for extension, the perineum band may now be adjusted and its ends fastened to the head of the bedstead. The body belt is to be carried around the opposite side of the trunk and secured so that the line of counter extension shall correspond to the line of the axis of the limb. The limb should be raised upon a hair-cushion sufficiently to clear the heel from pressure. The extending cord is to be passed over the pulley, and a weight attached to it.

Iron Fulcra, Weights and Sundries, for Extension of the Lower Extremities.

FIG. 3911.
Buck's Fulcrum and Weights.

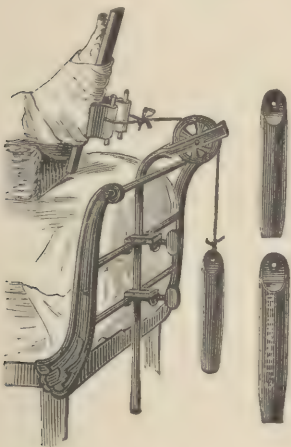


FIG. 3912.
Levis' Apparatus.

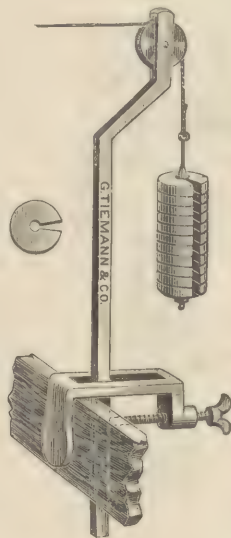
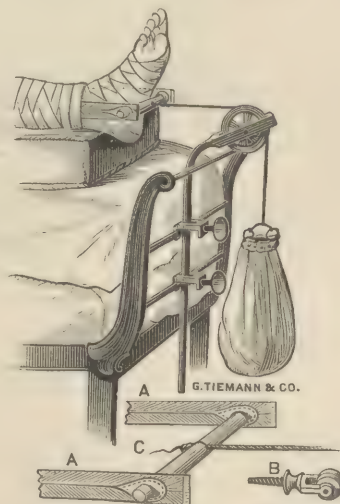


FIG. 3913.
Sayre's Extension Sundries.



Levis' apparatus (Fig. 3912) consists of adjustable clamps holding the upright rod which supports the pulley in position. Rod and pulley can be adjusted at any elevation required. The amount of weight extension is simply effected by a series of one-pound weights suspended upon a rod, bent into the form of a hook at the top, for catching in a loop in the extending cord. The upper portion of this rod is flattened or narrowed, the remainder of the rod maintaining a uniform diameter. In the centre of the weights a hole is drilled, into which the rounded or lower portion of the rod fits very tightly, and from which centre hole a slot is cut that, while it permits the passage of the rod in the upper constricted and flattened portion, is too narrow to allow of the weights slipping off the rod, no matter in what direction or with what force a blow may be struck or the apparatus displaced. The bag shown in connection with Fig. 3913, designed to hold sand or shot, answers the same purpose as the sets of weights.

Fig. 3913 shows Sayre's "extension sundries," consisting of two stout tapes, *A*, adjusted through button holes to the cross-piece, *C*. The ends of *A* are attached to the plaster secured to the limb, and *C* very nearly approaches the sole of the foot. To *C* is attached a strong cord, to run over the pulley *B*. To the end of the cord is to be attached a bag, as shown in Fig. 3913.

The following are the prices of these apparatus:

Buck's Extension Fulcrum, only,	\$3.00	Levis' Extension Fulcrum only,	\$3.50
The same, with Sayre's Extension Sundries,	4.00	The same, with Series of Weights,	5.00
Sayre's Extension Sundries, A, B, C,	1.00	Series of Weights separate,	2.00

WOUNDS AND INJURIES.

FRACTURE APPARATUS.

Extension and Counter Extension.

FIG. 3914.—Volkman's Sliding Rest.

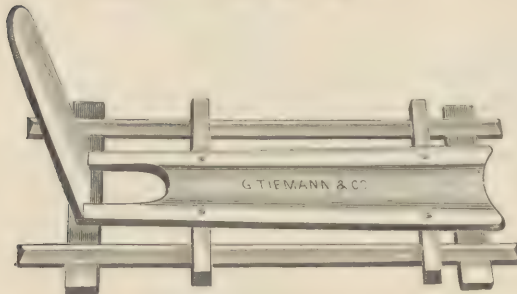
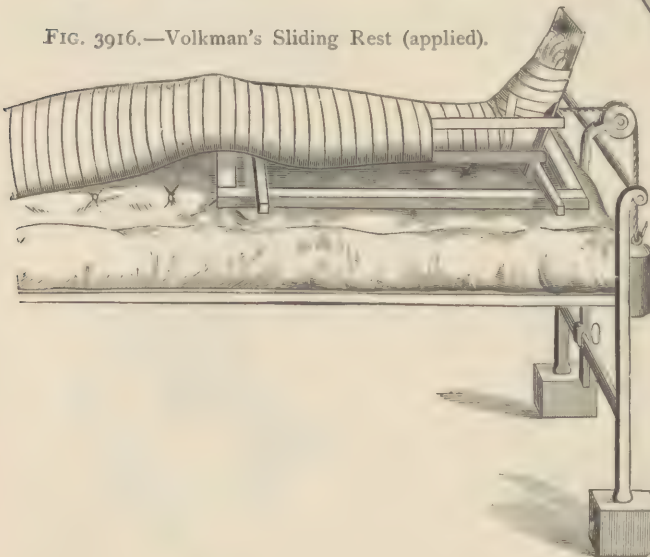


FIG. 3915.—Volkman's T Splint.

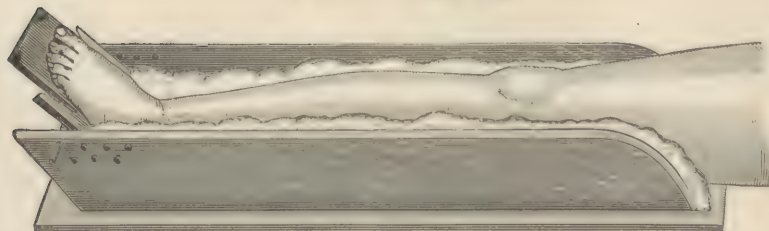


FIG. 3916.—Volkman's Sliding Rest (applied).



"In some instances it may be found advantageous to use Volkman's sliding foot-piece. This consists of a posterior splint for the leg, to which is attached a foot piece having an angle shown in the cut (Fig. 3914). This splint should be perforated for the heel, and rest upon two cross-bars of wood, which in turn slide up and down on a rectangular frame. Upon the upper edge of these bars a tongue is cut, and a corresponding notch or groove in the cross bars."—"Text-Book on Surgery." Wyeth.

FIG. 3917.—Fracture Box.



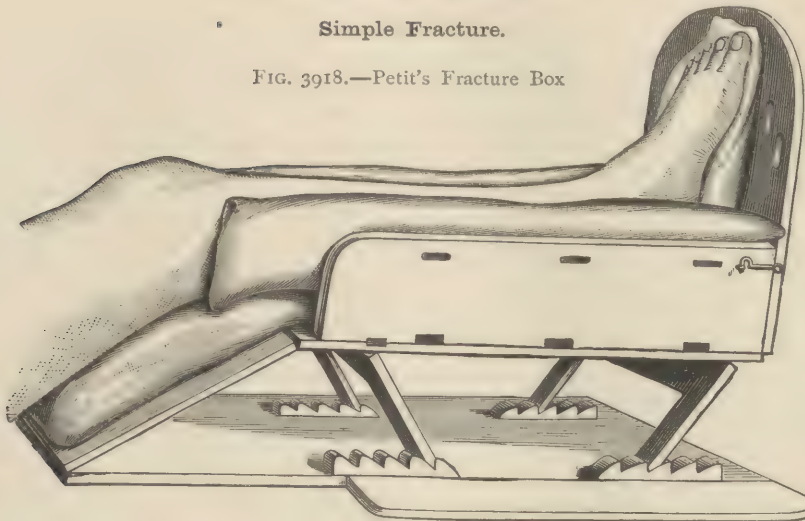
"To fix the part in the position of least discomfort for from five to six days, or until all danger of swelling is past; after this no method is so generally satisfactory as the plaster of Paris dressing. To meet the first indication the fracture box (Fig. 3917) is a most useful apparatus. It consists of a bottom, a foot-piece and two movable side-pieces. This may be placed upon a pillow or box to give it a slight elevation, or the apparatus may be modified after Petit's box (Fig. 3918). If any extension is needed, it may be secured by a bandage around the ankle and foot, which is also passed through the holes in the foot-piece. In fixing the leg in this fracture box the sides are turned down, a thick layer of cotton or some soft material arranged for the leg to rest upon, and shaped to fit the natural contour of the calf. The sides are also packed, turned into position, and fastened. As soon as the first swelling subsides, or as soon as it is evident that no marked swelling will occur, the plaster of Paris should be applied."—"Text Book on Surgery." Wyeth.

WOUNDS AND INJURIES.

FRACTURE APPARATUS.

Simple Fracture.

FIG. 3918.—Petit's Fracture Box



Treatment.

"Endeavor, on first approaching a patient suffering from fracture, to inspire him with a confidence that he is not to be unnecessarily hurt; sit quietly beside him, and inquire minutely into all the circumstances relating to the accident; remove the clothes from the injured limb with the utmost care; notice its position, contour, points of abrasion, discoloration, or swelling; pass the fingers lightly along the surface of the limb, pressing more firmly at points where there are appearances of injury; finally, to solve all doubts, grasp the limb so as to make traction of the lower fragment, rotate to obtain crepitus, and make lateral motions to indicate the false point of motion; in the application of the necessary dressings, let gentleness and a manifest regard for the patient's sufferings characterize every act; and, throughout the subsequent treatment of the case, proceed slowly, thoughtfully, and systematically, for rude and awkward manipulations, by which pain is needlessly inflicted, are frequent sources of inflammation, suppuration, and gangrene. In the simple fracture the bone is broken at a single point, the lesion is subcutaneous, and no other important parts are involved; it is, therefore, in the most favorable condition for repair."—F. H. HAMILTON.

"The signs of fracture, on which reliance can be placed, are: 1. Crepitus, obtained by rotating the lower fragment; 2. Preternatural mobility, produced by lateral movements of the fragments; 3. Spontaneous displacement, when reduction of the fragments has been effected. The treatment is replacement of the fragments, and maintenance of their extremities in apposition. Replacement should be effected as soon as possible after the accident."—F. H. HAMILTON. "The fragments may usually be placed in coaptation by extension and counter extension with the hands; but, should such means fail, anæsthetics must be used, and even pulleys."—BILLROTH.

"Maintenance is accomplished by side or coaptating splints, by long or extending splints, by the weight and pulley, by plastic apparatus or by a combination of these methods. Of the several appliances, the plastic apparatus, in its various forms, most effectually secures and maintains coaptation; but used as a bandage, when the fracture is accompanied with such injury to the soft parts as to render subsequent inflammation inevitable or probable, this form of dressing exposes to congestion, strangulation and gangrene."

"As safety in the use of this dressing depends much upon the skill and care of the surgeon, the rule should be never to resort to it unless familiar with all its peculiarities, and in a position to give the case necessary care."—A. C. POST. "When employed, the provisional callus will always be less, and, hence, firmness will result later, yet the formation of definite callus will not be disturbed."—BILLROTH. "But these objections do not apply to the different forms of gypsum splints" (J. CROFT) "which can be readily and perfectly adapted to support the limb and not endanger it by strangulation; these splints should be applied in the first stage of the case; swelling from contusion and subcutaneous laceration, unaccompanied with lesion of the vascular trunks, is not an objection to the immediate application of the apparatus; on the contrary, the support and enforced rest have a beneficial influence in controlling swelling and its consequent pain. As a rule, no bandage should at first be applied directly to the skin."—F. H. HAMILTON. "The dressings adapted to individual fracture must necessarily vary very much; but it may be stated, as a principle applicable to each case, that that apparatus is the best which, whilst it answers the indications equally well, exacts the least amount of skill and attention."—"Operative Surgery." Stephen Smith.

WOUNDS AND INJURIES.

FRACTURE APPARATUS.

Passive Motion.

'As fractures are constantly liable to be followed by weakness and stiffness of the limb, the rule is to move the joint nearest the injury as soon as the union is sufficiently advanced to preclude the possibility of displacing the fragments or interrupting the consolidating process. This constitutes what is called *passive motion*, a most important element in the management of this class of lesions. It should not be commenced, as a general rule, before the end of the third week, after which it should be repeated once a day, or every other day, according to circumstances; it should be very gentle at first, and be gradually increased until the limb has completely regained its normal functions. During its performance the parts are properly supported by assistants, and the dressings are reapplied the moment it is over. The restoration of lost function will be greatly promoted by frequent ablutions with warm water and soap, followed by systematic massage and frictions with some sorbefacient lotion, as spirit of camphor, soap liniment, or weak solutions of iodine. As soon as the callus has acquired sufficient firmness to sustain the ends of the broken bone, the splints and bandages are either discontinued, or applied more loosely, the object now being merely to keep the parts at rest until the union is perfectly consolidated. In fractures of the inferior extremity, some days should usually elapse before the patient is allowed to rise, and no weight should be thrown upon the affected limb under a fortnight or three weeks; the new bone is still weak, no definite callus has yet formed, and the individual, awkward from long disuse of his joints, is liable to fall from the slightest accident. These precautions are so extremely important that they should always receive the most scrupulous attention."—"System of Surgery." Gross.

Fracture of the Inferior Maxilla.

FIG. 3919.—Hamilton's Bandage.



"The *inferior maxilla* may be fractured at any point of the body and of the rami, or two fractures may occur. Of the variety of apparatus constructed, the most convenient and serviceable in general practice is an interdental gutta percha splint, moulded to the crowns of the teeth, and an external gutta percha or sole-leather cap for the chin, held in position by the four-tailed bandage."—STEPHEN SMITH.

'I have been able to overcome these difficulties, in some measure, by an apparatus constructed as follows:

"A firm leather strap passes under the chin and is buckled over the top of the head. It is stayed by two counter-straps of linen webbing. One of these is looped upon the maxillary strap at a point just above the ears, and may be elevated or depressed to fit different heads. This strap is buckled under the occiput posteriorly, and across the forehead anteriorly. A vertical strap, passing over the top of the head in the line of the sagittal suture, unites the maxillary and the occipital strap. To prevent the maxillary strap being displaced backward, a chin-piece is fastened to it."—F. H. HAMILTON.

Fracture of the Ribs.

"*Fracture of the ribs*, without complication or displacement, is easily managed with the plaster or water-glass dressing, the surface being protected with a layer of wadding or an ordinary flannel shirt. The bandage should be from two and a half to three inches in width, and drawn so tightly as to

compel the patient to breathe chiefly with the diaphragm. A thin flat compress, as a small old towel, properly folded, to give greater support to the broken bone, may sometimes be advantageously used. In children I know of no better dressing for a fractured rib than one made of adhesive strips. Similar dressings will answer in outward displacement of the fragments, only that a somewhat thicker compress may be necessary; if, on the contrary, the bone is driven inward toward the chest, it is obvious that counter-pressure applied to the extremities of the broken rib can be of no avail."—GROSS.

"If several ribs are fractured, they may be maintained in very accurate apposition by a broad band of adhesive plaster. Cut the plaster of a width to equal one-half the depth of the thorax, and of sufficient length to extend once and a half around the body. Place the strip under the patient, while recumbent, so as to inclose the lower half of the thorax, the adhesive side internal, and while he is in the act of forced expiration pass one end firmly over the thorax and the other in the opposite direction over the first; there is now a sense of suffocation, which is soon followed by relief—the pain quickly subsides. Do not change the dressing until the cure is complete.

"The *sternum* is occasionally fractured, but more frequently the manubrium is displaced from the gladiolus as a luxation. The fragments may be reduced by suitable pressure, and retained as far as possible by adhesive plaster fastened during expiration."—"Operative Surgery." Stephen Smith.

WOUNDS AND INJURIES.

FRACTURES OF THE UPPER EXTREMITIES.

Clavicle.

"*Clavicle.*—The line of the clavicle and the projection of the joint at either end can always be felt, even in the fattest persons. Its direction is not perfectly horizontal, but slightly inclined downwards, when the arm hangs quietly by the side. When the body lies flat on the back, the shoulder not only falls back, but rises a little, the weight of the limb being taken off. Hence the modern practice of treating fractures of the clavicle (in the early stage) by the supine position.

"On the front surface of the clavicle, not far from its acromial end, there is in many persons of mature age a spine-like projection of bone. So far as I know, it has not been described. A gentleman, himself a surgeon, showed me an instance in his own person. He suspected it was an exostosis. As a rule, the acromio-clavicular joint forms an even plane. But there is sometimes a knob of bone at the acromial end of the clavicle; or it may be only a thickening of the fibro-cartilage sometimes existing in the joint. In either case this relief might be mistaken for a dislocation, or even for a fracture. A reference to the other shoulder might settle the question. Being subcutaneous throughout, the clavicle can readily be seized and examined for fracture, &c. If before a glass the arm be swung around, raised and lowered, the shoulder be shrugged, &c., we shall appreciate the fact that this is the only bony connection the arm has with the body, and to what a very large extent it is movable, the sterno-clavicular joint being the pivot.

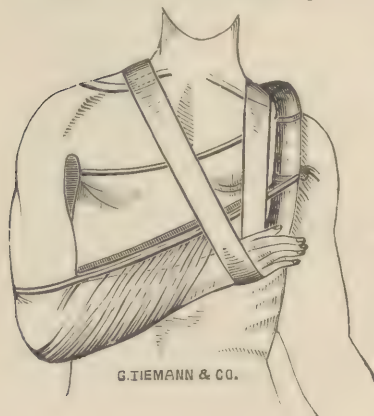
"*Tuberosities.*—Projecting beyond the acromion—the arm hanging by the side—we can feel, through the fibres of the deltoid, the upper part of the humerus. It distinctly moves under the hand when the arm is rotated. It is not the head of the bone which is felt, but the tuberosities—the greater externally, the lesser in front. These tuberosities form the convexity of the shoulder. When the arm is raised, this convexity disappears; there is a slight depression in its place. The head of the bone can be felt by pressing the fingers high up in the axilla. The absence of this prominence formed by the upper part of the humerus under the deltoid, and the presence of a prominence low in the hollow of the axilla, or in front, below the coracoid process, or behind, on the back of the scapula, bespeak *dislocation* of the head of the bone.

"In examining obscure injuries about the shoulder, it is worth remembering that, in the normal relation of the bones, and in every position, the great tuberosity faces in the direction of the external condyle. The head of the bone faces very much in the direction of the internal condyle. It is worth remembering, also, that the upper epiphysis of the humerus includes the tuberosities; and that it does not unite by bone to the shaft till about the twentieth year.

"By making deep pressure in front of the shoulder, when the arm is pendent and supine, we can feel the bicipital groove (between the two tuberosities). It looks directly forwards and runs in a line drawn vertically downwards through the middle of the biceps to its tendon at the elbow. We should be aware of this, lest it be mistaken for a fracture."—"Landmarks, Medical and Surgical." Luther Holden.

A is a wedge-shaped pad for the axilla, which is put in place thick side up. Two straps fastened to this pad pass directly upwards, and buckle to the broad supporting band on the acromion of the afflicted arm. This band is then passed across the back and over the shoulder of the sound side, and terminates in front of the chest, *E*. A sling to support the arm, elbow flexed, is buckled to the broad band. A strap, *D*, is attached to the back of the sling a short distance above the elbow, and passed obliquely across the back and buckled to the supporting band in

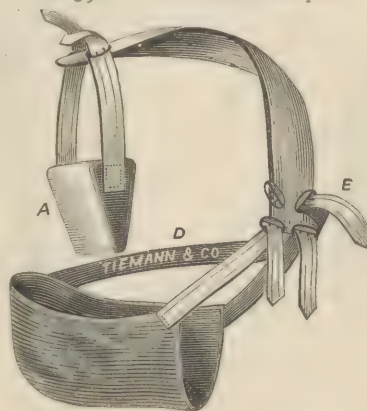
FIG. 3921.—Fox's Clavicle Splint.



front. The extra buckle comes in play when the apparatus is to be reversed, in using it for the other side. The shoulder is kept out by the sling, up by the wedge, and back by the strap, *D*.

These apparatus are made of four sizes: two sizes for adults, two sizes for children.

FIG. 3920.—Levi's Clavicle Splint.



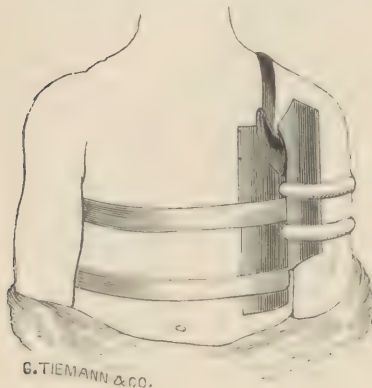
It consists of a padded ring with buckles attached, which fits over the sound shoulder, and of a wedge-shaped pad fitting the axilla of the injured side. On the top of this pad, pieces of webbing are fastened, one of which is to be passed anteriorly over the chest and buckled to the ring over the sound arm; the other over the posterior wall of the thorax, and fitted to the posterior portion of the ring, a sling, made of stout linen, in length about two-thirds of the forearm, and in depth sufficient to cover it completely, is then applied to the elbow and secured tightly to the ring.

WOUNDS AND INJURIES.

FRACTURES OF THE UPPER EXTREMITIES.

Clavicle.

FIG. 3922.—Richardson's Splint,
for Fractures of the Clavicle, Scapula
and Humerus.



G. TIEMANN & CO.

It is composed of three parts, and has three points of attachment, viz.: to the side, axilla and arm. The arm and body pieces are semi-cylindrical in shape, made of hard rubber, and fastened together by means of rivets, with sufficient space left between them to allow the passage of straps of adhesive plaster. The crescentic pad is received as a crutch in the axilla.

For fracture of the clavicle, the crutch is crowded firmly in the axilla, and the arm-piece secured to the arm by circles of adhesive strips; the shoulder is then raised, and the arm carried backwards until the fragments are brought into position, when the body-splint and crutch are secured alike by strips of plaster. If thought desirable, one strap may be passed over the opposite shoulder. For fracture of the scapula, the arm is carried forward instead of backward, before the splint is secured to the side. For fracture of the humerus, the arm is secured in its most natural and easy position. In all other respects the splint is adjusted the same as for fracture of either of the above-mentioned bones.

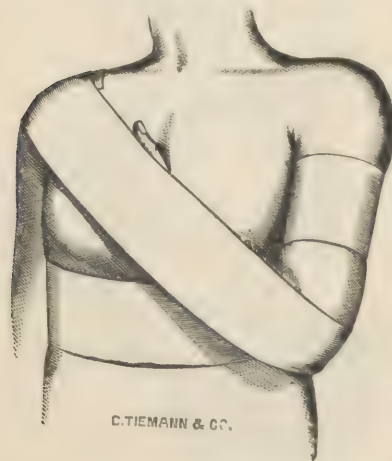
After the splint has been applied, the arm may or may not be flexed at a right angle on the chest, and supported by a sling from the neck.

Four sizes of this splint are made: two for adults, and two for children.

"*Velpeau's bandage* fixes the hand of the injured side upon the sound shoulder, and the elbow in front of the ensiform cartilage. It is very useful for fractures of the clavicle and for chronic inflammation of the shoulder-joint."—**ESMARCH.**

"After drawing the arm backward and retaining it there by a strip of adhesive plaster, pass another piece of plaster from the well shoulder across the back, and by pressing the elbow well forward and inward the first plaster around the middle of the arm is made to act as a fulcrum, and the shoulder is necessarily carried upward, outward and backward;

FIG. 3923.
Sayre's Dressing for Fractured Clavicle.



G. TIEMANN & CO.

and the plaster, being carried over the elbow and forearm (which is flexed across the chest) to the opposite shoulder, the place of starting, and then secured by pins and stitches, permanently retains the parts in position. Strong and good adhesive plaster is cut into two strips, three or four inches wide (narrower for children); one piece long enough to surround the arm and go completely around the body, the other to reach from the sound shoulder around the elbow of the fractured side and back to the place of starting. The first piece is passed around the arm just below the axillary margin and pinned or stitched in the form of a loop sufficiently large to prevent strangulation, leaving a large portion on the back of the arm uncased by the plaster. The arm is then drawn downward and backward until the clavicular portion of the pectoralis major muscle is put sufficiently on the stretch to overcome the sterno-cleido-mastoid, and thus pull the inner portion of the clavicle down to its level. The plaster is then carried smoothly and completely around the body and pinned to itself on the back to prevent slipping. This first strip of plaster fulfills a double purpose: first, by putting the clavicular portion of the pectoralis major muscle on the stretch, it prevents the clavicle from riding upward; and, secondly, acting as a fulcrum at the centre of the arm, when the elbow is pressed downward, forward and inward, it necessarily forces the other extremity of the humerus (and with it the shoulder) upward, outward and backward; and it is kept in this position by the second strip of plaster,

which is applied as follows: commencing on the front of the shoulder of the sound side, drawing it smoothly and diagonally across the back to the elbow of the fractured side, where a slit is made in its middle to receive the projecting olecranon. Before applying this plaster an assistant should press the elbow well forward and inward, and retain it there, while the plaster is continued over the elbow and forearm (pressing the latter close to the chest, and securing the hand near the opposite nipple); crossing the shoulder at the place of beginning, it is there secured by two or three pins. When this has been done, the deformity will have entirely disappeared, the fractured bones will be accurately adjusted, and as long as the strips of plaster maintain their position no amount of force can displace them."—*American Practitioner*. July, 1871.

WOUNDS AND INJURIES.

FRACTURES OF THE UPPER EXTREMITIES.

Shoulder, Humerus.

"*Shoulder* (F. *épaule*).—The most elevated part of the arm. The bones which concur in forming it are the scapula, head of the humerus, and the clavicle, united together by strong ligaments and covered by numerous muscles.

"*Humerus* (os *humeri* or *brachii* or *adjutorium* or *brachiale*, *brachium*, *lacertus*, *shoulder-bone*, *arm-bone*, Prov. *spaut-bone*, *spaw-bone*, *shull-bane*, F. *os du bras*), is the cylindrical irregular bone of the arm; the upper extremity of which has a hemispherical head connected with the scapula and two *tuberosities* or *tubercles*, a greater and a lesser (F. *trochiter* and *trochin*), for the attachment of muscles, between which is the *bicipital groove* or *fossa*. At the inferior extremity may be remarked: the *inner condyle*, the *outer condyle*; the *small head* (*capitulum*, F. *condyle huméral*), which is articulated with the radius; the *trochlea*, articulated with the ulna, &c. The humerus is developed by seven points of ossification: one for the body, one for the head, one for the greater tuberosity, one for the trochlea, one for the epicondyle, and another for the lesser head.

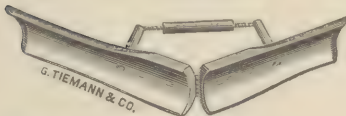
"*Humerus summus*: Top of the humerus, acromion."—DUNGLISON.

FIG. 3924.—Dressing for Fracture of Neck of Humerus.



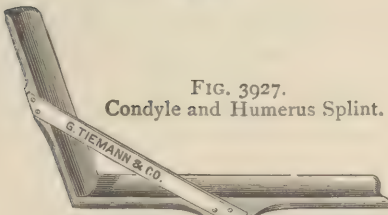
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FIG. 3925.
Joint Arm Splint.



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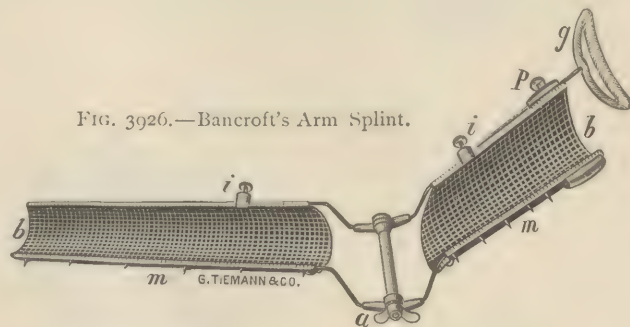
FIG. 3927.
Condyle and Humerus Splint.



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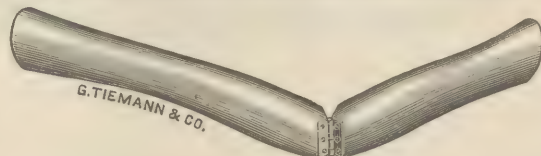
"The fragments being reduced as well as possible, a single splint, made of leather, felt or gutta-percha, long enough to extend from the acromion process to the elbow-joint, must be applied to the outside of the arm, enclosing about one-half of the circumference of the limb. This should be moulded and allowed to become dry and hard before it is secured to the arm. A second short splint should be laid on the inside of the arm; both of these splints, having previously been covered with a sack of woollen cloth, are then to be made fast to the arm by a roller; and, finally, the forearm being flexed upon the arm and suspended by a sling passing under the wrist, the arm must be secured to the side of the body by a separate roller."—"Hamilton's Surgery."

FIG. 3926.—Bancroft's Arm Splint.



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FIG. 3928.—Jointed Condyle and Humerus Splint.



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Elbow.

"It is of great importance to be familiar with the relative positions of the various bony prominences about the elbow. We can always feel the internal and external condyles. The internal is the more prominent of the two, and a trifle higher.

"*Olecranon*.—We can always feel the olecranon. This is somewhat nearer to the inner than to the outer condyle. (On strong flexion the groove in the humerus for the olecranon can be readily felt, and even seen.) Between the olecranon and the internal condyle is a deep depression in which lies the ulnar nerve (vulgarly called the 'funny bone').

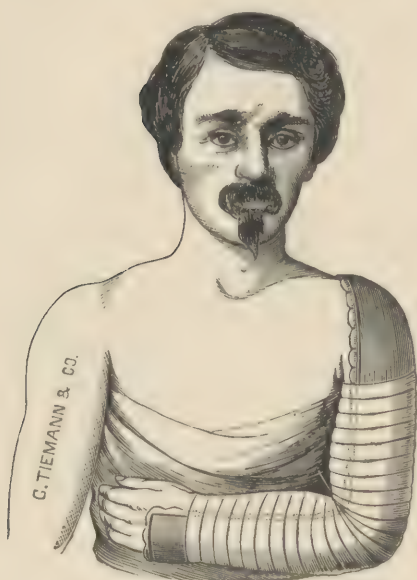
"On the outer side of the olecranon, just below the external condyle, is a pit in the skin, constant even in fat persons (when the elbow is extended). This pit is considered one of the beauties of the elbow in a graceful arm, it is seen in a child as a pretty little dimple. To the surgeon it is most interesting, as in this valley behind the supinator longus

WOUNDS AND INJURIES.

FRACTURES OF THE UPPER EXTREMITIES.

Elbow, Olecranon. (Continued.)

FIG. 3929.—Hamilton's Elbow Splint.



and the radial extensors of the wrist he can distinctly feel the head of the radius rolling in pronation and supination of the forearm. It is, therefore, one of the most important landmarks of the elbow, since it enables us to say whether the head of the radius is in its right place and whether it rotates with the shaft.

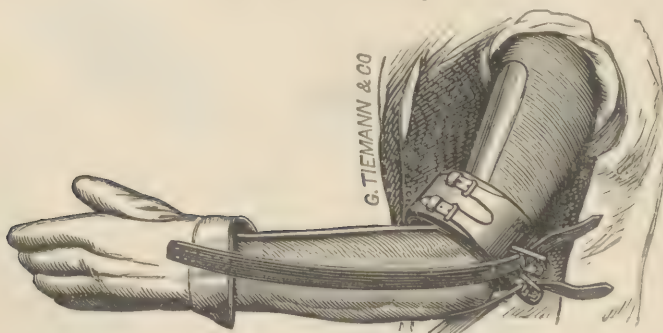
"Can the tubercle of the radius be felt? Yes, but only on the back of the forearm in extreme pronation. Its projection is then distinctly perceptible just below the head of the bone."—"Landmarks, Medical and Surgical." Luther Holden.

Fig. 3929 is made of gutta percha, moulded to fit the shoulder, arm and forearm; must be well padded, placed upon the limb and secured by roller bandage.

The forearm should be placed at a right angle with the humerus, and maintained in this position by a right-angled splint. The gutta percha splint, covered with a woolen or cotton sack, is first secured to the forearm by a roller; and then, in a case of fracture of the humerus above the condyles, while extension is made, the upper portion of the splint is secured to the arm in a similar manner. The front or bend of the elbow should always be well covered with cotton batting before enclosing the elbow-joint in the turns of the roller.

"Passive motion must be commenced very early, by loosening the dressing, supporting the parts at the joint, and making flexion and extension. If the fragments are not disturbed, repeat the manoeuvre daily."—STEPHEN SMITH.

FIG. 3930.—Clark's Splint.



Clark's apparatus consists of a band of ordinary sole leather, about two inches in width, and of sufficient length to surround the arm, lined with cloth or chamois and well padded with hair or cotton. In order to give the band additional firmness, and also to secure it around the arm, a strip of harness leather is stitched upon the outside, to one end of which two small buckles are attached while the other end, which extends about three inches beyond the band, is split or cut in two straps to correspond with and fasten into the buckles. The band is fastened around the arm above the fractured process, and may be drawn to any degree of tightness necessary to bring the broken fragment down, when traction is made.

Forearm and Wrist.

"*Ulna*.—The edge of the ulna can be felt subcutaneous from the olecranon to the styloid process (in supination). Any irregularity could be easily directed. The styloid process of the ulna does not descend so low as the styloid process of the radius, or it would impede the free abduction of the hand. Its apex is on a level with the radio-carpal joint. The head of the ulna is plainly felt and seen projecting at the back of the wrist, especially in pronation of the forearm. It then lies between the tendons of the extensor carpi ulnaris and extensor minimi digiti. There is often a subcutaneous bursa over it. (In supination it is the styloid process, and not the head of the ulna, which is felt posteriorly.)

"*Radius*.—The upper half of the shaft of the radius is so covered by muscles that we cannot feel it; the lower half is more accessible to the touch, especially just above and just below the part where it is crossed by the extensors of the thumb. Its styloid process is readily felt and made all the more manifest by being covered by the first two extensor tendons of the thumb. It descends lower, and lies more to the front than the corresponding process of the ulna. The

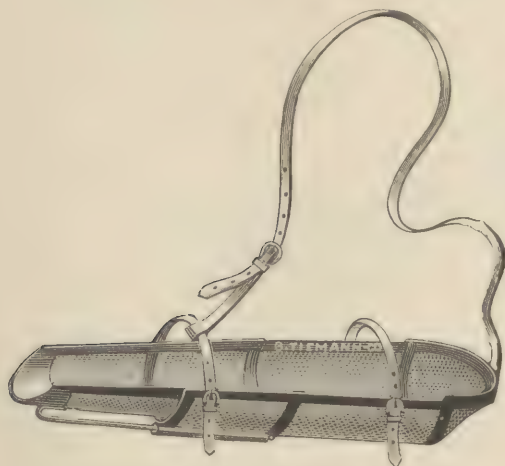
WOUNDS AND INJURIES.

FRACTURES OF THE UPPER EXTREMITIES.

Forearm and Wrist. (Continued.)

relative positions of these styloid processes can be best examined by placing the thumb on one and the forefinger on the other. Feel for the little bony pulley on the back of the radius near the wrist, which keeps in place the third extensor tendon of the thumb. This and the bone just above it is the place which we examine for a suspected fracture (termed Colles') near the lower end of the radius."—"Landmarks, Medical and Surgical." Luther Holden.

FIG. 3931.—Tiemann & Co.'s Forearm Splint.



With sliding extension for the hand to facilitate passive motion of the wrist, without removing the support. It is made of wire gauze fastened to a frame. It may be used for either arm, and is a very comfortable sling.

FIG. 3933.—Stillman's Bracket.

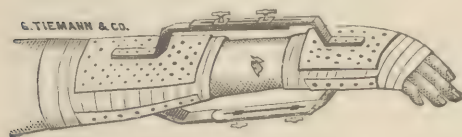


FIG. 3932, *a, b*.
Coover's Splint for Fractures of the Arm and Hand.

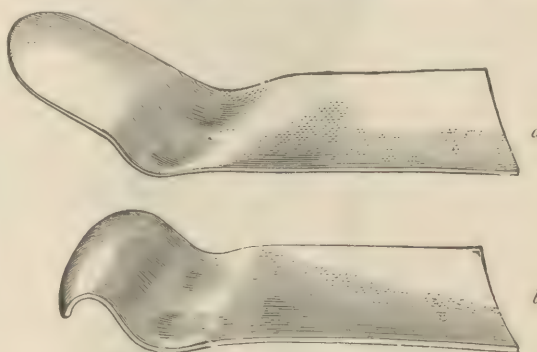


Fig. *a* can be used for all fractures of the arm and hand, with the fingers fixed upon the hand, and passive motion can be directed the first, second or third week, as the attending surgeon may direct, thereby keeping the tendons loose in their sheaths, and the patient will be enabled to secure the use of his limb sooner.

Fig. *b* will serve the object better, where the surgeon desires to keep the hand and fingers extended.

"By encircling the hand (except the fingers) and the forearm with plaster, and applying a bracket anteriorly and posteriorly, as shown in Fig. 3933, we are enabled to retain the wrist in any desired shape and yet keep up extension by means of the ratchets. In the treatment of Colles' fracture they will be found very valuable."—STILLMAN.

FIG. 3934.



Right and Left Radius Splints.

FIG. 3935.



FIG. 3936.
Squire's Fore-Arm Splint.

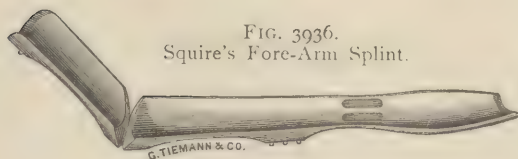


FIG. 3937.
Interosseous Splint.



WOUNDS AND INJURIES.

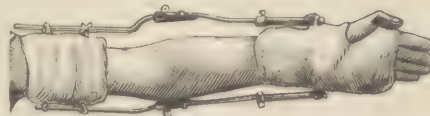
FRACTURES OF THE UPPER EXTREMITIES.

Forearm and Wrist. (Continued.)

FIG. 3938.—Smith's Arm Splint.



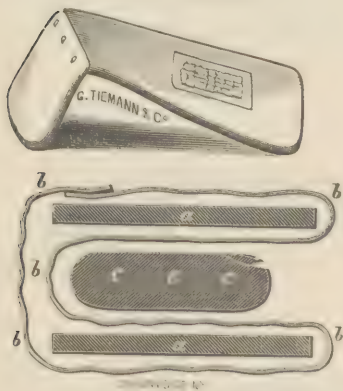
FIG. 3939.



"A varied experience, full of disappointments for the more severe fractures of the condyles, set me to work to make a splint with the following requisites: 1. To hold the fragments in apposition; 2. To allow the forearm to be flexed or extended, pronated or supinated, with fixation at any point; 3. To lengthen or lessen the external lateral angle of the arm with fixation; 4. To leave the entire elbow-joint exposed for local treatment during the whole time of wearing the splint, without disturbing it. The result of this work was a splint that my practice has proved to most happily meet every requisite mentioned.

"My splint is made with two rods of untempered steel, extending from the upper part of the arm to the wrist, with a ball and socket joint at the elbow, and screws for fixation; the lower ends pass into a sheath-screw on either side of the wrist; the upper ends pass through two iron posts set in tin and made fast to the arm by plaster of Paris bandages, the rods being made firm in the posts by thumb-screws. On each side of the wrist is a post through which the sheath-screw passes, and made fast to the wrist in the same manner as the upper parts, and fastened with fixation screws. By moving the sheath-screws the lateral angle of the arm may be contracted or widened as needed, thus overcoming any tendency to loss of the carrying point (or gunstock deformity). A turn of the fixation-screws at the elbow and wrist will allow the forearm to be flexed, extended, pronated, supinated and fixed at any desired point without other interference with the splint."—*New York Medical Record*, December 19, 1885. Samuel W. Smith, M. D.

FIG. 3940.—Shrady's Splint, for Colles' Fracture.



a, a, splints; *b, b, b*, plaster;
c, c, c, wrist; *d, d*, radial margin
of wrist.

This apparatus was devised by Dr. Shrady for the purpose of correcting extreme deformity in cases of Colles' fracture of the radius. It is to keep the hand in the double relation to the forearm of flexion and of deflexion towards the ulnar margin.

Some of these splints are made with a short hand-piece adapting itself to the palm proper, or with a long hand-piece extending from the wrist to the tips of the fingers. For the employment of either of these forms the surgeon must, of course, be governed by the peculiar indications of the case. We also make the splints with adjustable flexion and deflexion.

The fragments being placed as near as possible in apposition, by flexing the wrist and deflecting the hand, the splint is applied to the palmar surface of the forearm. By means of a strip of adhesive plaster three inches in width, which is made to form a sort of lateral sling or loop for the ulnar portion of the wrist, the tendency to lateral displacement of the ulna is in a great measure overcome. This loop, as seen in the cut, embraces the wrist and splints (the usual dorsal splint being always used). The ulnar margin of the wrist is thus in a sling formed by splints and the plaster, the radial margin of the wrist being free. The ulnar margin of the wrist is thus made a very efficient fulcrum. In cases of extreme lateral displacement, a suitable

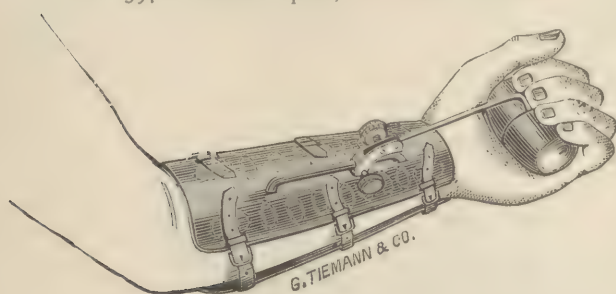
WOUNDS AND INJURIES.

FRACTURES OF THE UPPER EXTREMITIES.

Forearm and Wrist. (Continued.)

margin of wood is tacked to the ulnar margin of the palmar splint to give additional purchase. The splints are kept parallel to each other by suitable strips of plaster, and the hand, by the same means, is secured to the hand-piece. The radius and ulna are kept in their proper relations to each other by the usual precaution of directing the palmar surface of the forearm and hand upwards and inwards, looking towards the face, the whole apparatus being suspended at a right angle with the arm by a sling. In order to prevent undue stiffness of the wrist and fingers by too long confinement, Dr. Shradly advises that passive motion be resorted to early, and persisted in every two or three days. This is done, without disturbing the fragments, by grasping the apparatus firmly at the wrist and freeing the hand.

FIG. 3941.—Hewit's Splint, for Colles' Fracture.



This splint is designed, in addition to its function as a retentive splint, to promote passive motion in the fingers and wrist-joint as well as to give support to the hand. It accomplishes these objects, as will be seen by the cut, by means of the rod connected with the ball grasped by the hand, and is joined to the sliding-bar on face of the splint by ball and socket joint. This joint enables the hand to make limited motions of flexion and extension, and also of pronation and supination. The natural tendency to relax and contract the fingers promotes this intention.

FRACTURES OF THE LOWER EXTREMITIES.

Femur, Thigh-bone.

Trochanter Major.—The trochanter major is the most valuable landmark, to which we are continually appealing in injuries and diseases of the lower extremities. There is a natural depression over the hip (in fat persons), where it lies very near the surface, and can be plainly felt, especially when the thigh is rotated. Nothing intervenes between the bone and the skin except the strong fascia of the gluteus maximus and the great bursa underneath it.

“The top of the trochanter lies pretty nearly on a level with the spine of the pubes and is about three-fourths of an inch lower than the top of the head of the femur. A careful examination of the bearing of the great trochanter to the other bony prominences of the pelvis, and a comparison of its relative position with that of the opposite side, are the best guides in the diagnosis of injuries about the hip and the position of the head of the femur.

Nelaton's Line.—If in the normal state you examine the relations of the great trochanter to the other bony prominences of the pelvis, you will find that the top of the trochanter corresponds to a line drawn from the anterior superior spine of the ilium to the most prominent part of the tuberosity of the ischium, this line also runs through the centre of the acetabulum. The extent of displacement in dislocation or fracture is marked by the projection of the trochanter behind and above this line. Nelaton's line, as it is termed, theoretically holds good. But in stout persons it is not always easy to feel these bony points so as to draw the line with precision. A surgeon must, after all, in many cases trust to measurement by his eyes and his flat hands—his best guides. Thus, let the thumbs be placed firmly on the spines of the ilia, while the fingers grasp the trochanters on each side. Having the sound side as a standard of comparison, the hand will easily detect any displacement on the injured side. Hippocrates bids us compare the sound parts with the parts affected (in fractures) and observe the inequalities.”—“Landmarks, Medical and Surgical.” Luther Holden.

Femur, Extra Capsular Fractures.

Prognosis in Extra Capsular Fractures.—These fractures are almost invariably impacted; the neck being driven into the shaft and base of the trochanter, splitting the trochanter and the upper end of the femur into several small fragments. The fragments are not, however, completely detached from each other, or even widely separated, owing to the strength of the aponeurotic expansion and tendinous attachments which surround them. The impaction continuing, bony union takes place with great certainty and rapidity, and without any disappearance of the neck by absorption. The trochanteric fragments generally remain perceptibly separated; but in addition to this there ensues, very often, an extraordinary deposit of bone, outside of the capsule, in the form of spindles, called osteophytes, which sometimes surround the neck like a coronet, and even project upward at points until they reach the pelvic bones.

Treatment of Intra and Extra Capsular Fractures.—It was the opinion of Sir Astley Cooper that, considering the improbability of bony union in cases of intra-capsular fractures, under any plan of treatment, and the danger of the

WOUNDS AND INJURIES.

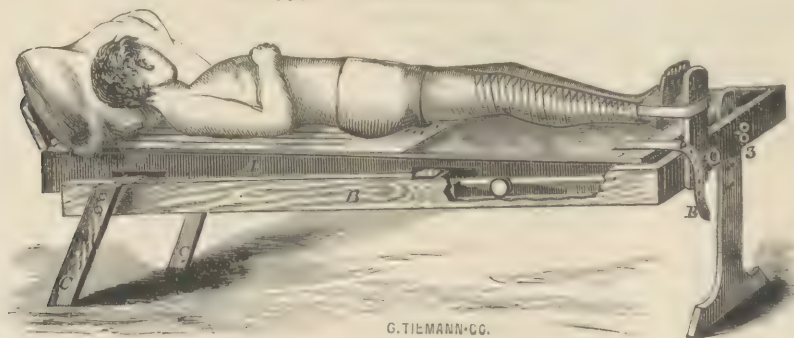
FRACTURES OF THE LOWER EXTREMITIES.

Femur, Thigh-bone. (Continued.)

patient's becoming bedridden, or of sinking under protracted confinement, it would be better in all cases to disregard the fracture wholly, leaving the patient for a time in whatever position was found to be most comfortable, and then to get him upon crutches as speedily as possible. I cannot entirely agree with this distinguished surgeon in this matter. Sir Astley Cooper did not deny the possibility of bony union. He admitted, moreover, the impossibility sometimes of establishing a complete diagnosis, since it could not always be affirmed that the fracture was not partly within and partly without the capsule. Occupying myself the same position in reference to these two points, I do not see how we can properly disregard treatment. On the contrary, we ought, I think, to treat all cases of intra capsular fracture, including even cases of suspected fracture, as if we knew them to be in a condition favorable for bony union: provided only that, from day to day, we attentively observe the condition of the patient, and that whenever a failure of strength, which can be fairly traced to the confinement, is noticed, we shall lose no time in accepting Sir Astley's advice.

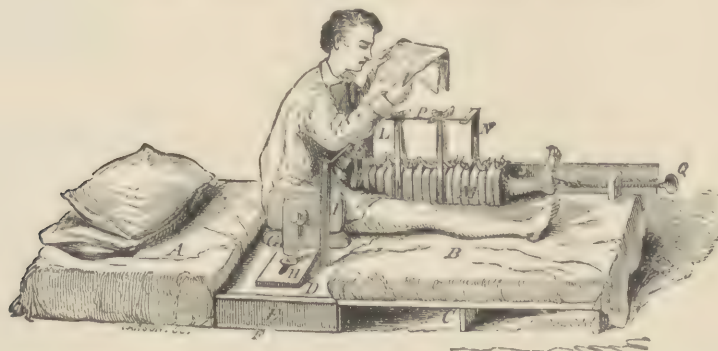
"A variety of 'fracture' or 'invalid' beds have from time to time been constructed, but in an ordinary case any firm bed with a suitable mattress will serve the purpose."*—HAMILTON.

FIG. 3942.—Skinner's Fracture Bed.



By referring to the cut, the surgeon will readily comprehend the manner of treating a fracture on this bed. In the cut, *A* represents the bed proper, or the sliding portion thereof, which is six feet long, two and one-half feet wide, six inches high at the head and one inch at the foot. It is covered about two-thirds of its length with zinc cut into strips and laid longitudinally to the bed. A hole is made through this covering for defecation, which hole is covered with a sheet-iron cap that can be withdrawn when required. The side rails of the bed, *A*, rest on six rolls that run in grooved ways on each side of the frame, *B*, and the arrangement is such that, when the top of the bed is in a horizontal position, the two legs at the foot of the bed are about six inches higher than the posts at the head, thereby causing a strong tendency in the bed to roll in the latter direction—extension being caused by the weight of the patient's own body.

FIG. 3943.—Burge's Apparatus for Fracture of the Femur.



* See "Buck's Extension," page 582, "Volkmann's Sliding Rest," page 500, and "The Crosby Invalid Bedstead," Fig. 1252.

WOUNDS AND INJURIES.

FRACTURES OF THE LOWER EXTREMITIES.

Femur, Thigh-bone. (Continued.)

"The *femur* is liable to be fractured through the neck, within and without the capsule, below the trochanter minor, in the central portions of the shaft, just above the condyles, through the condyles and at the points of epiphyseal connections. Fracture of the neck, including even cases of suspected fracture, should be treated as if in a condition favorable to bony union, in order both to save the patient from the pain and suffering caused by the irregular contractions of the muscles, due to the pressure of the broken fragments against inflamed tissues, and to insure a longer limb and less eversion if bony union does not take place. Fractures of the shaft are generally oblique, and the fragments over-ride from half an inch to two inches, owing to the contraction of the muscles; fractures just above the condyles are in most cases oblique from above downwards, and from behind forwards. All of these forms of fracture can be treated more successfully in the straight than in the flexed condition, and in nearly all cases extension is more effectually made by the weight and pulley than by any other method. The sooner the limb is put up and subjected to this method of treatment after the fracture the better; suffering is prevented, and the sufferer made comfortable from the outset. Precisely the same form of apparatus is not suited to all fractures of the femur, but certain modifications are required to meet all of the indications present."—HAMILTON.

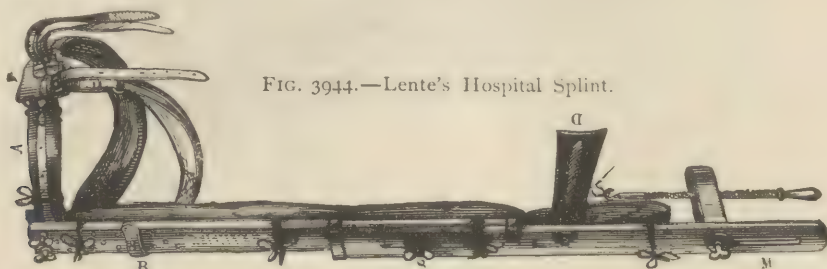


FIG. 3944.—Lente's Hospital Splint.

"This apparatus is a modification of the splint originated by Desault nearly a century ago, and altered by various surgeons from time to time; but especially by Dr. Physic, who introduced it into the Pennsylvania Hospital, and by Dr. Gordon Buck, who introduced it into the New York Hospital in 1837.

"Desault proposed to make the tuberosity of the ischium the *point d'appui* of the counter-extending force. Dr. Physic extended the outside splint to the axilla, thus bringing the direction of the counter extension more in a line with the axis of the limb, and almost the entire pressure on the groin. Adhesive plaster bands were first proposed by Drs. E. Wallace and J. Crosby, and adapted to the New York Hospital apparatus by Dr. Lente, when resident surgeon of the establishment, in 1849 or 1850. He reduced the outer splint again to its original length (to the crest of the ilium).

"From the top of this splint passes, in a curved form, over the abdomen to the median line, a steel brace, padded (A, Fig. 3944). To the end of this the pelvic band is buckled, and upon its slides a plate (P), fixed at any required point by a binding screw, to the bottom of which the perineal band is buckled, as seen in the engraving. The iron brace is attached to the splint by binding screws, so that it may be shifted, and the splint thus adapted to either side of the body. The posterior portion of the perineal band passes under the thigh just below the tuberosity of the ischium, and is buttoned to the outer splint at a point about opposite the greater trochanter, or at such a point that, when extension is being made, the band shall exactly grasp the tuberosity, and not slip under it. After all the extension has been made, by means of the screw, that the patient can bear comfortably, the bands, being elastic, continue the extension, and by a very gradual and imperceptible force, a force, however, most difficult to resist—tire out the contracted muscles of the thigh, and still further enlarge the limb. A spiral spring has also been enclosed in the ferule terminating the screw to which the hook for the extending band is fastened.

"Dr. Lente's remaining modification is a foot-piece (D, Fig. 3944), attached by a slide and thumb-screw to the mortise in the external splint, and capable of removal at pleasure. This is intended, first, to prevent a usual tendency to eversion of the foot; and, secondly, by projecting a little beyond the toes, to take off the pressure of the bed-clothes.

Application of the Apparatus.

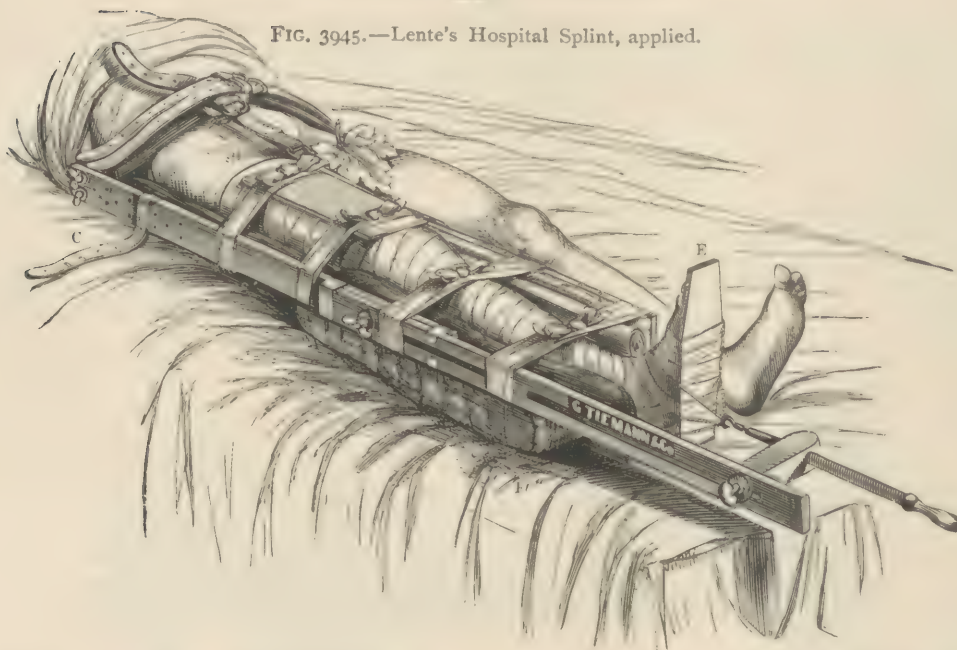
"Having laid the patient on a firm, unyielding mattress, covered, if you prefer, with one or two folded blankets, and measured the respective lengths of the sound and injured limbs, comparing the results of two or more measurements (from the anterior superior spinous process to the internal malleolus), shave the leg from the knee to the ankle, apply a strip of adhesive plaster, three inches broad, and well warmed, to both sides of the leg, from just below the knee, allowing them to extend some inches below the sole of the foot. These free ends are to be warmed and smoothly stuck to a thin block a trifle wider than the ankle-joint, through holes on either side of which a strong cord is to be passed,

WOUNDS AND INJURIES.

FRACTURES OF THE LOWER EXTREMITIES.

Femur, Thigh-bone. (Continued.)

FIG. 3945.—Lente's Hospital Splint, applied.



to be attached to the hook or ring terminating the screw. A roller bandage is now to be applied from the foot to the groin, taking care to make considerable pressure over the adhesive strips. The long splint, having been adjusted to the length of the limb, and its cushion secured to it, is to be placed along the outside of the limb, its top just reaching to the crest of the ilium; then, having passed the pelvic band under the body, a guttured splint furnished with a thin cushion, long enough to extend from the tuberosity to the popliteal space, is to be passed under the thigh. At the same time the perineal band, previously buckled to the iron brace, is to be passed under the thigh and adjusted in its proper place. The extending band is now to be secured to the screw, while an assistant is making moderate traction on the foot, and at the same time pushing up the long splint; the object of this being to tighten everything before commencing extension with the screw, every turn of which will then give an increase of tension. If, after this, the splint is found to have been forced up a little higher than the crista ilii, the perineal band must be buckled at either end a little tighter, in order to rectify this. The inside splint may now be applied, and the concavity between its cushion and the leg a little more than filled up with folds of old blanket or some such elastic material; so that, when the splints come to be bound firmly together, the inner condyle of the femur may not be painfully pressed upon, a circumstance which causes great discomfort to the patient; a guttured splint, a little longer than the posterior, must now be placed on the anterior aspect of the thigh, and then all the splints with the enclosed limb are to be encircled with four strips of strong muslin or linen about an inch and a half wide, and long enough to pass twice around the splints and tie in a bow-knot, two of these for the thigh and two for the leg. The arrangement of these bands is of considerable importance, as it is thus that we are enabled to dispense with the old-fashioned splint-cloth, a very troublesome contrivance, and to keep the splints from tilting forward without it. One end is to be placed under the limb, then around it in front, under again, and around in front, to be there tied to the other end. In doing this, it is seldom requisite to raise the limb sufficiently to disturb the patient. These bands are now to be loosely tied; and, having made a degree of extension, by means of a screw, corresponding to the amount of shortening, the foot-piece is to be screwed on so as to be in apposition with the outer surface of the foot. The bands are now to be firmly tightened and tied; and, if care has been taken to keep the inner condyle from undue pressure, they may be tightened to any required degree without any inconvenience to the patient. Next, the wedge-shaped cushion is to be placed under the apparatus; and, finally, the pelvic band is to be tightened as firmly as the patient can comfortably bear. A patient under treatment with this apparatus can attend to the calls of nature with very little inconvenience. He has only to raise his hips slightly with the aid of the leg and arm of the sound side, while the bed-pan is slipped under him without deranging the apparatus in any degree. The peculiar arrangement of the perineal band secures it from being soiled, as it is removed from the immediate vicinity of the anus."

WOUNDS AND INJURIES.

FRACTURES OF THE LOWER EXTREMITY.

Femur, Thigh-bone. (Continued.)

FIG. 3946.—Double Incline Plane (Wood).

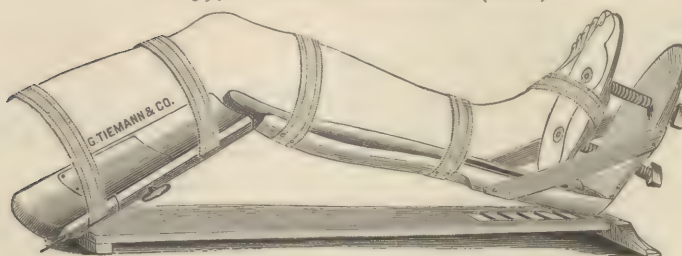
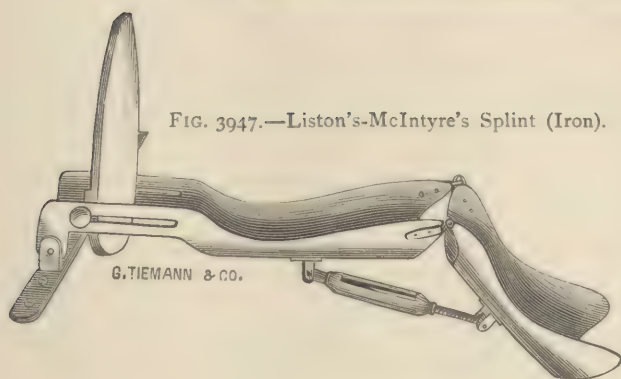


FIG. 3947.—Liston's-McIntyre's Splint (Iron).



Liston's splint is particularly applicable to the treatment of fractures of the condyles of the femur and of the upper extremity of this bone attended with a disposition to displacement of the lower end of the upper fragment. It may also be advantageously employed in compound fractures attended with severe contusion and laceration of the integuments, as it affords an easy and comfortable position to the injured limb. It is applied to the limb by attaching the foot to the foot-board and the limb to the splint by a roller bandage. The angle of flexion is regulated by the screw. The splint is made of galvanized iron.

"The question in relation to the treatment of fractures of the femur, which has given rise to the greatest diversity of opinion among surgeons of the present day, is that of position; and upon this point the testimony of authority may be briefly stated as follows:

"Until Percival Pott wrote his treatise on fractures, about the middle of the last century, nearly all surgeons had treated fractures of the thigh in the straight position. From that period up to about the close of the first quarter of the present century, probably a majority of surgeons adopted the flexed position recommended by Pott. To-day the vast majority of the leading hospital surgeons in Europe and in America have returned to the straight position."—HAMILTON.

FIG. 3948.—Extension Bar.

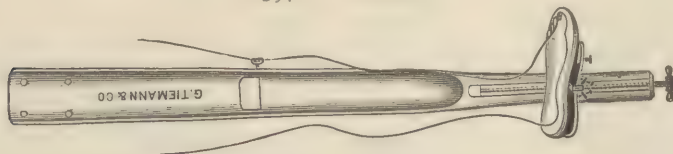


FIG. 3949.
Crutches.



Crutches.

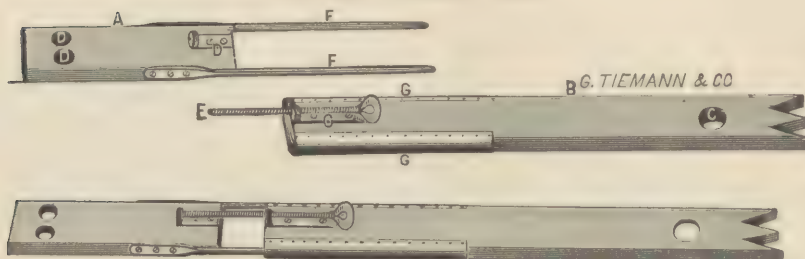
Lancewood, rubber bottoms, per pair,	\$12.00
Maple-wood, rubber bottoms, per pair,	11.00
Plain Maple, per pair,	7.00
Plain Hickory, per pair,	4.00
Hickory, rubber bottoms, per pair,	5.00
Children's, per pair,	3.00 to 4.00
Sockets for Crutches, with rubber, per pair,	4.00
Crutch Rubbers,	.45

WOUNDS AND INJURIES.

FRACTURES OF THE LOWER EXTREMITIES.

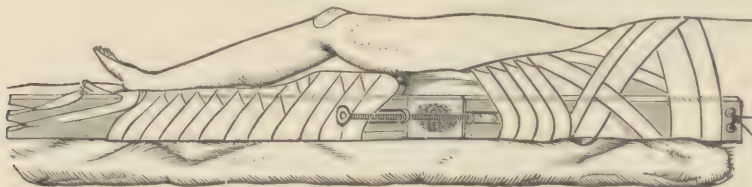
Femur, Thigh-bone. (Continued.)

FIG. 3950.—Munger's Splint.



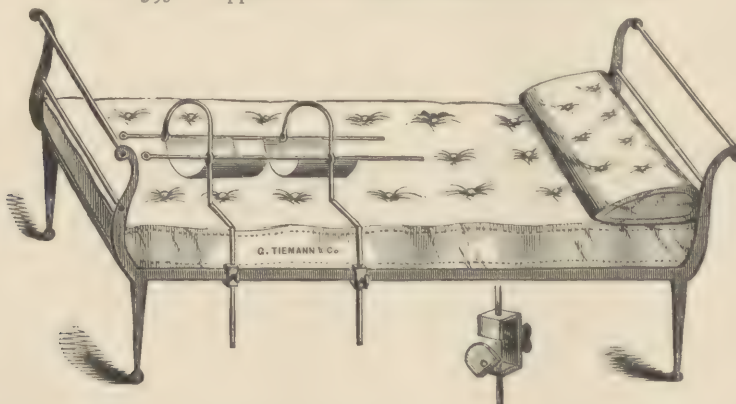
FF, iron rods three-eighths of an inch in diameter and a foot or more in length, are fitted to the upper or body portion of the splint, these rods slide into grooves, *GG*, in the lower section *B*, which are covered with tin to prevent displacement of the bandages. At the upper end of the lower segment is attached an iron brace, *D*, through the head of which runs a screw, *E*, ten or twelve inches in length. The end of this screw strikes against a corresponding brace, *D*, attached to the upper segment, and it is by turning this screw that the two portions of the splint are forced apart. By this means extension is made and kept up to any desired degree.

FIG. 3951.—Munger's Splint Applied.



Application.—Each section should be well padded, and the whole then applied to the limb in the same manner as Liston's splint, with rollers and perineal band, except the space between the sections, which is not to be covered by the roller but with a light dressing separate from the rest. By this means the wound may be examined and cleaned as often as necessary without disturbing any other portion of the apparatus. The surgeon, with a few turns of the screw, easily forces the limb to its natural length.

FIG. 3952.—Apparatus for Gunshot Fractures of the Femur.



This apparatus is composed of strong iron bars, suitably bent, through which are passed two horizontal sliding rods, supporting two pieces of canvas, upon which the limb may be placed. The perpendicular bars are furnished each with a clamp and thumb screw, by means of which they may be made fast to the side-rails of an iron bedstead, or, in case of necessity, to the side of a stretcher. The clamps enable the surgeon to suspend the limb at any height from the bed, and to give to the canvas bottom any degree of inclination desirable.

WOUNDS AND INJURIES.

FRACTURES OF THE LOWER EXTREMITIES.

Leg, Tibia and Fibula.

Leg.—The portion of the lower extremity which extends from the knee to the foot. It consists of three bones: tibia, fibula and patella.

"The *tubercle of the tibia* (for the attachment of the ligamentum patellæ), the sharp front edge called the shin, and the broad flat subcutaneous surface of the bone can be felt all the way down. The inner edge can be felt too, but not so plainly. The lower third is the narrowest part of the bone and the most frequent seat of fracture."—"Landmarks, Medical and Surgical." Luther Holden.

"The *head of the fibula* is a good landmark on the outer side of the leg, about an inch below the top of the tibia and nearly on a level with the tubercle. Observe that it is placed well back, and that it forms no part of the knee-joint and takes no share in supporting the weight.

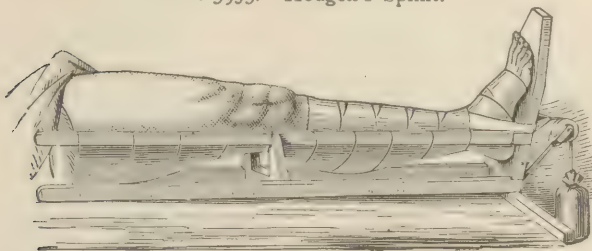
"The shaft of the fibula arches backwards, the reverse of the shaft of the tibia. The flat of the bones not being on the same plane should be remembered in flap amputations. The shaft of the fibula is so buried amongst the muscles that the only part to be distinctly felt is the lower fourth. Here there is a flat triangular subcutaneous surface, between the peroneus tertius in front and the two peronei (longus and brevis) behind. Here is the most frequent seat of fracture."—"Landmarks, Medical and Surgical." Luther Holden.

"*Malleoli.*—The shape and relative position of the malleoli should be carefully studied, as the great landmarks of the ankle. The inner malleolus does not descend so low as the outer, and advances more to the front; at the same time, owing to its greater antero-posterior depth, it is on the same plane as the outer behind. The lower border of the inner malleolus is somewhat rounded, and the slight notch in it for the attachment of the lateral ligament can be felt. The outer malleolus descends lower than the inner, thus effectually locking the joint on the outer side. Its shape is not unlike the head of a serpent. Viewed in profile, it lies just in the middle of the joint. In a well formed leg the inner edge of the patella, the inner ankle, and the inner side of the great toe, should be in the same vertical plane. Look to these landmarks in adjusting a fracture or dislocation, keeping at the same time an eye upon the conformation of the opposite limb.

"In consequence of violence, usually a sprain, a sliver of the internal surface of the thick malleoli may be broken off, seriously implicating the joint, but yet not perceptible by mobility, crepitus, or otherwise, from the exterior. Mr. Callender has happily named such 'sprain-fractures.'

"Into the inter-malleolar space the astragalus is tightly wedged or mortised, and we have here a valuable means of diagnosis in case of Pott's fracture of the fibula three or four inches about the external malleolus. In such a fracture this inner-malleolar space is widened. If now the leg be seized by one hand above the ankle, and the foot by the other, with the palm under the sole, the thumb and the fingers will have the astragalus in their grasp. The astragalus can then be pushed sidewise against the outer malleolus and then suddenly towards the firm inner malleolus, against which it will come with an easily-perceived impact if there be fracture. If none exist, the astragalus will have no lateral play. Motion at the medio-tarsal joints must not be mistaken for the tibio-tarsal movement."—"Landmarks, Medical and Surgical." Luther Holden.

FIG. 3953.—Hodgen's Splint.



This apparatus is intended for complicated fractures of the lower extremities. It consists of a wooden frame, formed of four square bars of the length of the lower extremity. These bars are united by a crescent-shaped piece of wood situated at the back of the knee, and a foot-board below, two on either side of the leg. The lower two serve the purpose of holding together, and giving the apparatus an inclined plane; the upper bars serve as points of attachment for a number of linen straps or rollers to suspend the limb. They are placed side by side and fastened with

pins, and constitute a perfect bed, having the advantage of adapting themselves to the differences in the conformation of the limb. The foot is retained to the foot-board by long adhesive plaster strips being passed around the foot-board and carried upwards and secured to both sides of the leg with roller bandage, leaving a sort of loop beneath the foot-board, through which a rope is passed and attached to a little bag weighted with sand, for the purpose of keeping up extension. Counter extension is made by a perineal band, the end of which is secured to the head of the bed. A long cross-bar under the foot-board, resting on the bed, prevents the apparatus from tilting. Bricks may be placed under the inferior legs of the bed, to give the apparatus an inclination towards the pelvis. One of the advantages of this instrument is that each of the bands of linen may be removed separately, any wound dressed and the band reapplied without displacing the others.

WOUNDS AND INJURIES.

FRACTURES OF THE LOWER EXTREMITIES.

Leg, Tibia and Fibula. (Continued.)

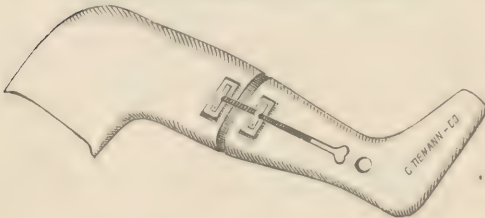
"Having experienced considerable difficulty in removing plaster of Paris dressings when applied by the roller bandage, and especially when obliged to remove them on account of pain caused by an increase of the swelling, I respectfully submit to the profession a method of application by which these disadvantages may be avoided.

FIG. 3954.—Wagerhagen's Splints.



"Having procured a woollen or cotton stocking sufficiently long to reach to the knee-joint, I cut from it, as a pattern, six layers of coarse red flannel (1), one-quarter of an inch larger to allow for shrinkage. The flannel is then soaked in water, pressed and laid over the back of a chair ready for use. A one-quarter inch cotton rope is now sewed to the posterior median line of the stocking. The plaster of Paris being in process of preparation, the stocking is cut in the anterior median line, applied to the fractured limb, and laced up in front, including the rope (2), extension and counter extension being kept up by assistants, and the fracture adjusted. Each layer of the flannel is now separately saturated in the plaster paste, and applied, three layers to each side of the limb, being careful to avoid covering the rope. After this is done, a layer of plaster paste is applied to the flannel, and, when this has become sufficiently dry, a coating of shellac varnish is applied, which produces an elegant finish, and also gives firmness to the splints. The varnish will dry in about fifteen minutes. This dressing can be removed in from three to five minutes by loosening the rope from the plaster and cutting the thread which binds it to the stocking. The rope having been removed, the plain stocking surface can be cut through with an ordinary pair of scissors. The splint is then removed in two lateral portions, each half of the stocking remaining attached to its corresponding splint (3)."—*New York Medical Journal*, Sept., 1875. G. Wagerhagen, M. D. (See Fig. 3880.)

FIG. 3955.—Raphael's-Pott's Splints.



Used for fractures of the fibula when they occur about two or three inches above the lower end, usually resulting from a fall upon the foot, in consequence of which the foot is violently twisted outwards, and sometimes the ankle is itself dislocated. This modification of Pott's splint consists in the addition of the screw for extension.

Pott's original dressing is composed of an outside angular splint seven inches in width, constructed of deal board with a projection to accommodate the foot; it is well padded, and has a hole with bevelled edges to accommodate the

external malleolus. It is placed on the outside of the limb, which must be flexed on the abdomen, and the leg kept at a right angle with the thigh. On the inside of the leg a padded straight splint of felt, leather or pasteboard, extending from the ankle to the knee, is placed, and the two secured by roller bandage. The limb is allowed to rest on its outer side.

FIG. 3956.—Depuytren's Fibula Splint.



FIG. 3957.—Dressing Splints.



Depuytren's splint is constructed of a single board, about four inches wide, and must extend from the condyle of the femur to two or three inches beyond the foot. Upon this a long triangular pad must be laid, the thickest portion of the triangle corresponding to a point about an inch above the internal malleolus. The bone is then set, and the splint, with the pad resting upon it, lying along the inside of the leg, which is secured by roller bandage—the bandage not covering the site of the fracture.

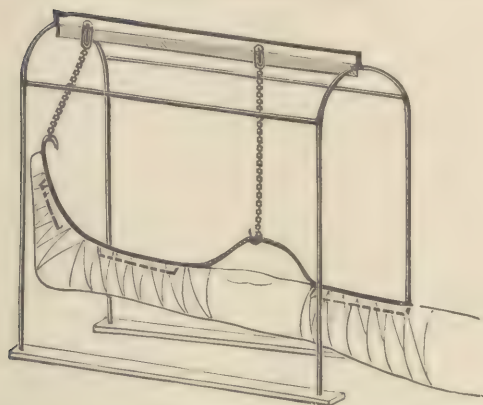
See "POROUS FELT SPLINTS," page 577, and "LEVIS' METALLIC SPLINTS," page 580.

WOUNDS AND INJURIES.

FRACTURES OF THE LOWER EXTREMITIES.

Leg, Tibia and Fibula.

FIG. 3958.—Salter's Cradle.



For protecting a fractured limb from the pressure of the bed-clothes, and to permit change of position without the risk of displacing the bones. It is a frame resting upon the bed and having on its central bar a small railway, upon which travel two pulleys, suspending by a chain the wounded limb (placed in such splinting as the surgeon may select) and protecting it from all external pressure.

FIG. 3959.—Left Ankle Splint.

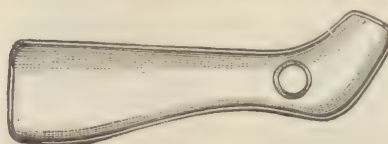


FIG. 3961.—Fracture Box, Reversible. By Dr. J. F. Fry.

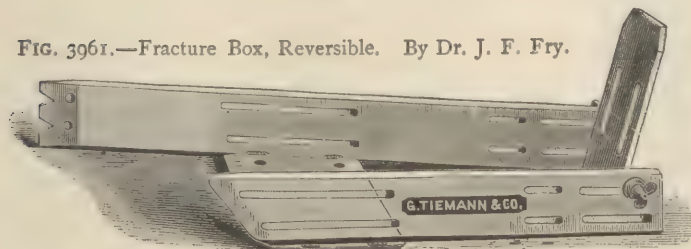
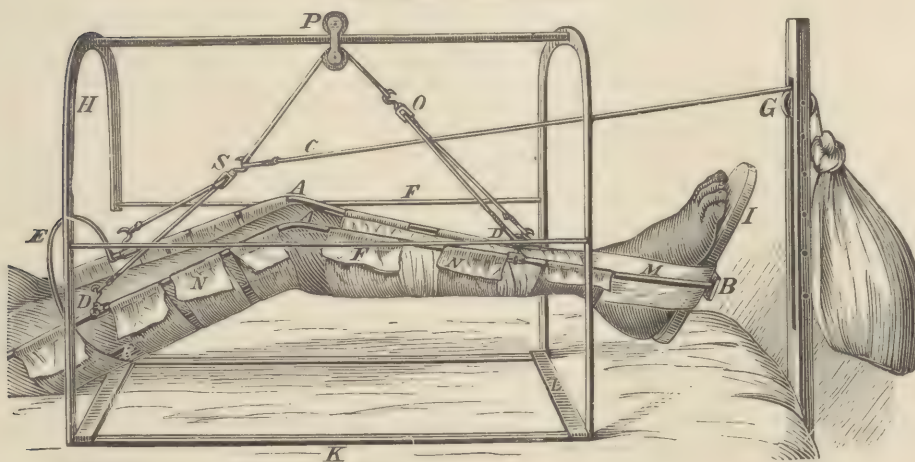


FIG. 3960.—Right Ankle Splint.



See "VOLKMANN'S T SPLINT,"
Fig. 3915.

FIG. 3962.—Clark's Splint.



The attachment for extension is by means of adhesive strips, *M*, extending to near the knee and passing around a foot-piece, *I*, to which is attached a small bracket, *B*, which hooks over the lower end of the main splint. Then the limb is suspended by four hooks, *DD*, which are attached to thimbles that slide back and forth upon the bar, and are fixed at the desired point by means of thumb-screws in their outer sides. Extension is made by means of the cord, *C*, attached to the hook in the pulley at *S*, passing forward between the cords playing over the pulley at *O*, to drop over the pulley, *G*, fixed in a post at the foot of the bed, and then attached to a sand-bag of sufficient weight to make the necessary amount of extension. The weight ordinarily required for an adult is from ten to fifteen pounds. A uniform traction is exerted upon the limb, in whatever position the body of the patient may be placed.

WOUNDS AND INJURIES.

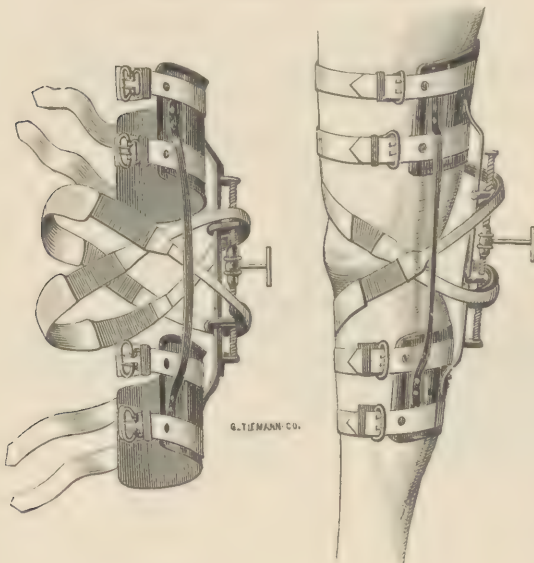
FRACTURES OF THE LOWER EXTREMITIES.

Leg, Patella.

"*Paletta* (Lat., a small pan, the knee pan, diminutive of *patina*, *patena*, a pan or dish; Fr., *patelle*."—WEBSTER.

"A sort of sesamoid, flat, short, thick, rounded bone, situate in front of the knee, and enveloped in the substance of the tendon common to the extensor muscles of the leg. The posterior surface of the patella is divided into two *facettes*, united angularly, which are incrustated with cartilages, and each of which is articulated with one of the condyles of the femur. The patella is developed by a single point of ossification. When the patella is fractured, it is difficult to produce bony union. This can only be accomplished by keeping the fractured extremities closely in apposition."—DUNGLISON.

FIG. 3963.—Turner's Patella Splint.



"The apparatus consists of thigh and leg-pieces of sheet-iron, with two buckled straps attached to each, united by two lateral bars and one posterior bar of steel. To the posterior bar are two troughs, on a double reversed screw; by turning the key in opposite directions, the troughs separate or approach each other. The apparatus should be applied in simple fractures as soon as possible; but if, in the opinion of the surgeon, it would aggravate existing inflammation, thereby jeopardizing the joint, it could be applied as a posterior splint, without using the coapting appliance, until antiphlogistic measures make it safe.

"In applying the apparatus, it should be well padded with flannel or other material, for protecting thigh and leg from the splint and straps; quadriceps femoris should be relaxed, the limb held by the thigh portion, and buckled; also buckle the leg portion.

"First fix the lower fragment, by drawing it up, smoothing the integuments down; this being held by an assistant, the surgeon applies a strip of adhesive plaster, of sufficient width to hold the fragment, and overlaps it sufficiently to prevent any tilting up, passes the free ends of the adhesive plaster around the upper trough, crosses them and applies them to the skin.

The upper fragment being coapted, the integuments being smoothed up, a similar piece of plaster is applied around the lower trough as around the lower fragment. Interpose something where the plasters cross each other, to prevent their sticking together.

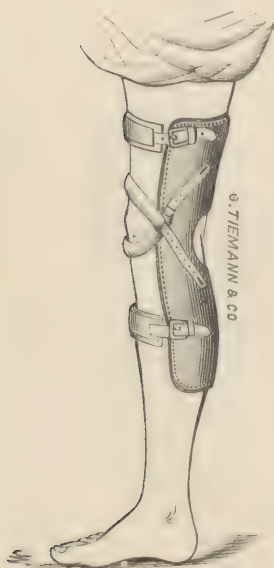
"For firmness, use double strips of plaster. Snip the upper edge of the upper plaster; thus a rounded edge instead of a cutting edge will be presented to the integuments, avoiding in a degree excoriation. The apparatus should remain applied thirty or forty days. When new dressings are applied, the patella being held, cautious passive motion may be made. After the apparatus is permanently removed, the patient, to favor consolidation, should wear something to prevent too much use of the patella, say for four or six months, viz., an elastic knee-cap with a ring arrangement over the patella, or posteriorly a piece of gutta-percha or leather strapped above or below the joint, either of which, being softened by warm water, can be applied and allow of certain flexion. Passive motion can be occasionally made, but not extreme, under six months."—*Medical Record*, July 15, 1867.

This apparatus consists of a light tin splint, covered with morocco. The coapting appliances are a pair of strong webbings or straps, well padded in the middle, which are drawn across the fragments obliquely and tightened by means of buckles or hooks.

DIRECTIONS FOR MEASUREMENT.

- | | |
|---|---------|
| 1. Length from above ankle to upper third of thigh, | Inches. |
| 2. Right or left leg? | " |
| 3. Circumference of thigh, | " |
| 4. Circumference of calf, | " |

FIG. 3964.
Hartshorn's Patella Splint.



WOUNDS AND INJURIES.

FRACTURES OF THE LOWER EXTREMITIES.

Leg, Patella.

FIG. 3965.
Patella Splint. 4 sizes.



FIG. 3966.
Jointed Patella Splint, with Screw. 4 sizes.

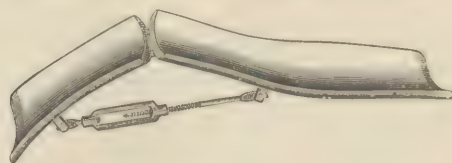
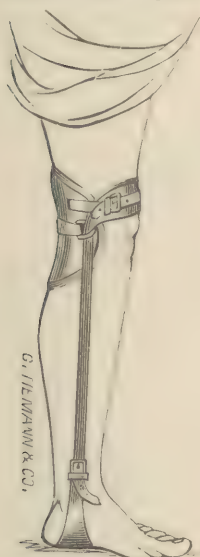


FIG. 3967.
Levis' Patella Splint.

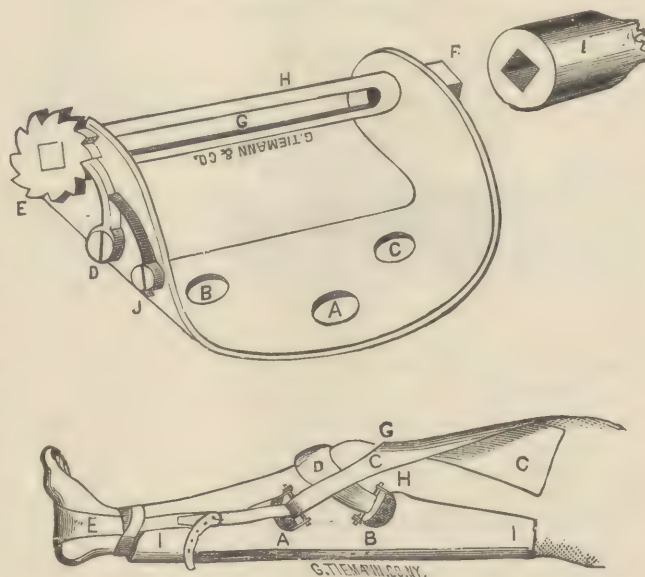


This apparatus consists of a broad pad, resting on the popliteus, to keep the knee extended, and a narrow pad, fitting the upper border of the patella. A strap connected with the latter one is first passed through a ring attached to the popliteal pad, then continued down the leg on each side, being finally buckled to a lined foot-pad. This makes the foot a fixed point for extension, and the ring through which the strap passes gives it also a direction backwards, maintaining a firm hold of the upper fragment of the patella, whilst the lower fragment is readily kept in place by a strip of adhesive plaster.

DIRECTIONS FOR MEASUREMENT:

1. Circumference above knee, Inches.
2. Length from sole of foot to knee, "

FIG. 3968.—Denison's Extension Windlass.



This little instrument is intended to serve surgeons in country practice, who, not being able to resort to an instrument maker in urgent cases, are compelled to depend on their own skill to devise means of treating fractures or deformities. It is a substitute for the screw power or the rack and pinion, and may be attached to wooden supports or splints. If attached by one screw it will be movable, swivel-like, self-adjusting; if fastened by two or more screws it is made stationary.

A, B and C, holes for screws or tacks; *H*, winding-rod, slotted at *G*, squared at *F*, for key *I*, and held in position by ratchet *E* and pinion *D*, with spring-attachment *J*. Length of the winding-rod, two and one-quarter inches; between the arm of the brackets one and three-quarter inch.

A A and *B B*, extension and counter-extension windlasses, each fastened by one screw to wooden posterior splint; *C C*, fan-shaped adhesive plasters, crossing each other at *C*, and threaded through winding-rods *F F*, *D*, padded roller over ligamentum patellæ, the ends of which are threaded through winding-rods *H H*, *E*, reserve counter-extension to relieve *D* from uncomfortable pressure in front of knee *I I*, point at which splint is bandaged to the limb.

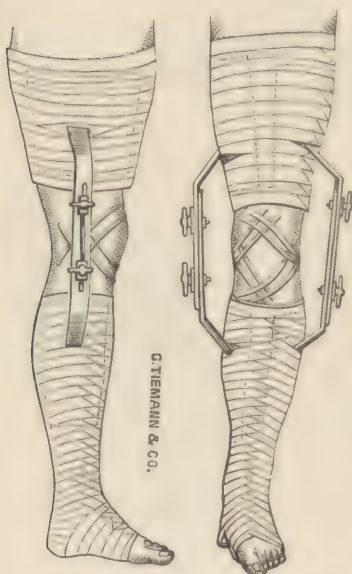
Many other uses and methods of attachment will suggest themselves to the ingenious surgeon. Our space does not allow a fuller description, for which we refer to *The New York Medical Record*, May, 1875.

WOUNDS AND INJURIES.

FRACTURES OF THE LOWER EXTREMITIES.

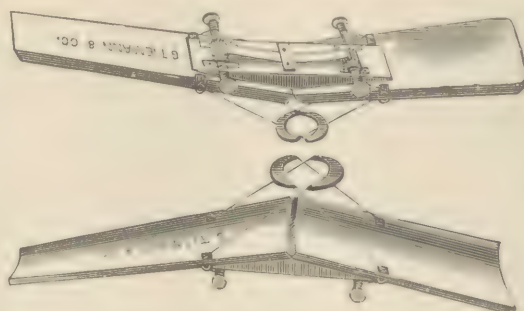
Leg, Patella.

FIG. 3969.
Stillman's Patella Brackets.



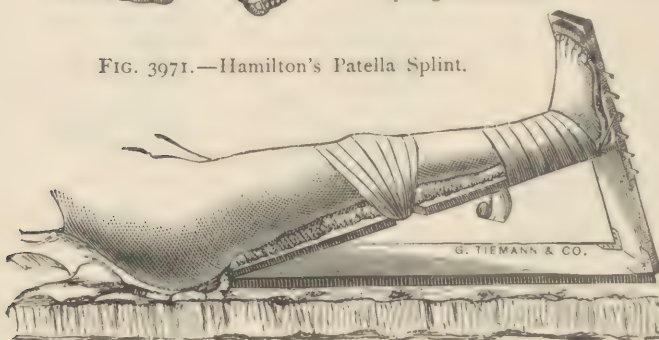
The plaster and brackets being applied as delineated in the cut (Fig. 3969), it only remains to hold the fragments together by means of an elastic webbing attached to the two bridges, or by strips of adhesive plaster. Thus we ensure absolute freedom from motion, are enabled to watch the fragments, keep them thoroughly in approximation, at the same time subduing all tendency to inflammatory action with external applications.

FIG. 3970.—Boisnot's Patella Splint.



The splint is concave, to suit the convexity of the limb. The semi-lunar pieces are of stout leather, doubled and crimped. The cords pass over pulleys to revolving transverse pieces, which are protected from slipping by spring and ratchet.

FIG. 3971.—Hamilton's Patella Splint.



"The dressing which I have usually employed in the treatment of this fracture, consists of a single inclined plane, of sufficient length to support the thigh and leg, about six inches wider than the limb at the knee. This plane rises from a horizontal floor of the same length and breadth, and is supported at its distal end by an upright piece of board, which serves both to lift the plane and to support and steady the foot. The distal end of the inclined plane may be elevated from six to eighteen inches, according to the length of the limb and other circumstances. Upon either side, about four inches below the knee,

is cut a deep notch. The foot-piece stands at right angles with the inclined plane, and not at right angles with the horizontal floor. It may be perforated with holes for the passage of tapes or bandages to secure the foot. Having covered the apparatus with a soft and thick cushion carefully adapted to all the irregularities of the thigh and leg, especial care being taken to fill the space under the knee, the whole limb is now laid upon it, and the foot gently secured to the foot-board, between which and the foot another cushion is placed. The body of the patient should also be flexed upon the thigh, so as the more effectually to relax the quadriceps femoris muscle. A compress made of folded cotton cloth, wide enough to cover the whole breadth of the knee, and long enough to extend from a point four inches above the patella to the tuberosity of the tibia, and one-quarter of an inch thick, is now placed on the front of and above the knee. While an assistant presses down the upper fragment of the patella, the surgeon proceeds to secure it in place with bands of adhesive plaster. Each band should be two or two and a half inches wide, and sufficiently long to enclose the limb and splint obliquely. The centre of the first band is laid upon the compress, partly above and partly upon the upper fragment, and its extremities are brought down so as to pass through the two notches on the side of the splint, and close upon each other underneath. The second band, imbricating the first, descends a little lower upon the patella, and is secured below in the same manner. The third and so on successively until the whole of the compress and knee is covered, is carried more nearly at right angles around the leg and splint, the last band passing obliquely from below the ligamentum patellæ upwards and backwards. The dressing is now completed by passing a cotton roller lightly around the whole length of the splint, commencing at the toes and ending at the groin."—"Hamilton on Fractures and Dislocations."

WOUNDS AND INJURIES.

FRACTURES OF THE LOWER EXTREMITIES.

Leg, Patella.

FIG. 3972.
Bacon's Patella Support.

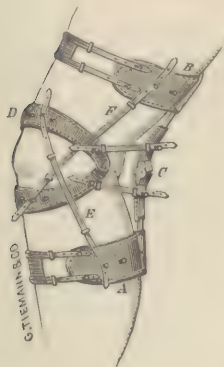
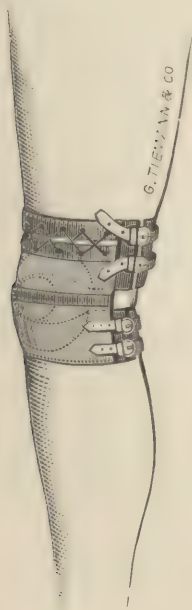


FIG. 3973.—Tiemann's
Patella Support.



Patients recovering from transverse fracture of the patella, with "aponeurotic union," are constantly liable to repeated ruptures of this adventitious tissue, each successive accident widening the gap between the fragments of the bone and lessening the power of the leg extensors. The frequency with which such patients fracture the opposite patella, in their attempts to save the weakened joint from renewed injury, is well known.

To give efficient support to joints thus impaired, the appliance here shown (Fig. 3972) has been devised, and has been worn with satisfaction by several patients, one of whom, having an ill-united fracture of each patella, was able to mount a flight of stairs immediately upon the application of the apparatus, for the first time since the injury was received.

Authorities on surgery say that great care must be taken not to rupture the ligaments of the newly formed union, which so often happens after recovery of the patient from fractured patella. For the purpose of guarding against such a recurrence, we make the apparatus shown (Fig. 3973). It consists of a knee-cap made of buckskin or satin jean, which is adjustable to the knee by buckles or laces. It is provided with a pair of coaptation pads, to retain the newly united patella in place. These pads are arranged to approximate by drawing on laces, as shown in the upper border of the cap, represented in illustration (Fig. 3973). It affords the patient exercise of the knee-joint, the best guard against the danger of ankylosis, at the same time preventing any undue strain on the newly united upper fragment of the patella.

DIRECTIONS FOR MEASUREMENT FOR FIGS. 3972, 3973:

1. Circumference above knee, Inches.
2. Circumference of knee, "
3. Circumference below the knee, "

The Treatment of Fractured Patella.

"The question of the best treatment for fractured patella has recently been brought into prominence. The medical and clinical societies of London at their meetings in November made the matter the subject of prolonged and animated debates, during which some interesting statistics were brought forward by Mr. G. R. Turner and Mr. Bryant. Dr. William Macewen also contributed a paper on the same subject in the *Lancet* of November 17th. The chief point at issue was the adoption of the practice of cutting into the knee-joint, drilling the two fragments, and uniting them by a stout silver wire; the whole being done under the strictest antiseptic precautions. The question further was, whether, admitting that the operation is justifiable in old and intractable cases where the leg is almost useless, it is also justifiable in recent cases. The early operation received the qualified endorsement of Mr. Lister, and the unqualified and earnest support of Dr. Macewen.

"The statistics presented by Mr. Turner, however, showed that this operation is not without danger to life and limb, while the statistics of Mr. Bryant and the general experience of other surgeons showed that the treatment of fractured patella by simpler methods was attended with just as good results as was the more radical operation.

"The debates on the whole show, as stated by the *Lancet*, that the operation was not suitable as a primary measure, nor for general employment. That, when performed, the operation should be done with every possible antiseptic measure, and that when, as in intractable cases, it is positively indicated, the earlier the operation is performed the better."—*The Medical Record*, December 8, 1883.

COMPOUND FRACTURES.

"A fracture is compound when it communicates through a wound with the external air. These injuries have always been regarded as dangerous, because such wounds commonly inflame and suppurate (HUNTER); but, when they are protected from the action of septic ferments, recovery will occur with slight inflammation and suppuration. The first question to determine is as to the possibility of saving the limb, and, as a rule, the attempt should be made if injury to the soft parts is not very great; if the bone does not largely protrude and the skin is not extensively lacerated; if the continued warmth of the limb below the fracture indicate the escape of the main artery, and that the nerves are not

WOUNDS AND INJURIES.

COMPOUND FRACTURES.

Continued.

implicated (F. C. SKEY). The thorough use of disinfectants, by which putrefactive suppuration is now prevented, adds largely to our means of saving limbs after compound fractures.

The first indication is to convert the compound into a simple fracture when the opening is very slight and readily closed; this may be done with collodion, or with any dressing which hermetically seals the wound. If the bone protrude, attempt reduction by extension and counter extension; if this fail, introduce the finger or the spatula into the wound and endeavor to stretch the skin over the sharp point of the bone; if all efforts fail, enlarge the wound sufficiently to insure return; if the bone is denuded or very sharp, saw off the projecting end; ligate the ruptured arteries, which can be readily found. Anæsthetics may be useful during these efforts (F. H. HAMILTON). If the case is seen at once, cleanse the wound, disinfect every portion liable to contain septic ferments, secure perfect rest, and prevent the entrance of any poisons. Employ the antiseptic dressing, which best meets these indications (J. LISTER), as follows: Use the spray during the dressing; if the contusion is slight, inject carbolic solution, 1 to 20, into the wound, and apply the gauze; if there is much contusion, enlarge the wound and inject the same solution freely and forcibly among the injured tissues, and dress as before; repeat the injection at every dressing when the discharge is offensive, opening the wound more freely, if necessary, to reach deeper recesses. If the suppuration has extended very deeply, and is offensive, the wound must be still more freely enlarged, and a solution of carbolic acid in wine, 1 to 5, injected, and, if necessary, through a tube introduced to the most remote recess. If the gauze is not at hand at each dressing, after thoroughly disinfecting all parts of the wound with carbolic solution, fill the cavities and the entire open spaces with pledges of lint saturated with carbolic oil.

"The plastic dressing should next be applied; if there is danger of too much swelling, it may be applied only to the under and lateral surfaces, leaving the upper and injured surface free. As early as possible, however, the gypsum dressing should be so employed as to completely envelop the limb, a protective being placed next to the skin, as cotton batting, or thick flannel; when completed and nearly dry, a fenestrum, or, if necessary, two or three, should be cut out so as to give full access to the wound; the limb is then suspended."—"Operative Surgery." Stephen Smith.

SHOT FRACTURES.

"Projectiles (T. LONGMORE) cause a variety of partial and complete fractures; the former are: (1) removal of a portion of bone, (2) splintering off of fragments of the external cylindrical part of a bone, (3) making a hole throughout the entire substance of the bone, (4) driving the external cylinder into the cancellated structure; the latter are: (1) simple when the injury is indirect, and (2) compound when the projectile is brought in direct contact with the injured bone. These fractures are always serious injuries, as they frequently involve the question of a resection and amputation, and are always liable to dangerous complications, as hæmorrhage, tetanus, septicæmia and pyæmia. The course of treatment indicated varies with the bone fractured and the nature and extent of the injury."—"Operative Surgery." Stephen Smith.

"1. The *superior maxilla* has such relations to the structure of the face that every effort should be made to preserve its symmetry when broken by shot injuries. Unless the fragments are either completely detached or but slightly adherent, they should not be taken away, but replaced with care, as in time consolidation may take place, and very little permanent deformity be left; after careful adjustment of the movable fragments, close the wound with adhesive plaster and apply cold water dressings; if fragments subsequently loosen, remove them (J. J. CHISOLM). Bony union of these fragments usually takes place with great facility (F. H. HAMILTON).

"2. The *inferior maxilla*, fractured by projectiles, is with difficulty retained in position; the fragments should be preserved and adjusted, and efforts made to retain them in apposition by the four-tailed bandage, with pasteboard cap for the jaw, and interdental splints of gutta percha (HAMILTON).

"3. The *clavicle* is in such relations with the pleural cavity and the larger vessels of the neck that serious complications frequently attend shot fractures of that bone. In the treatment of uncomplicated fractures remove detached splinters immediately, and necrosed fragments at the earliest practicable moment (G. A. OTIS), then leave the injury to nature, with as little operative interference as possible, for the less the wound and bones are manipulated the better the result (BECK).

"4. The *humerus* should always be subjected to conservative treatment, unless extremely injured by a massive projectile, or longitudinal comminution exist to a great extent, or a joint is also involved, or, finally, the patient's health is unfavorable (T. LONGMORE). In cases which admit of conservative treatment, proceed as follows: If the bone is much splintered, extend the wound, if necessary, for exploration and operation, at the most depending opening if there are two wounds, or make a fresh incision if only one exists and it is not in a favorable position; make an examination with the finger for any foreign bodies or detached pieces of bone, and remove them; remove also such partially detached portions and fragments as are retained only by very slight and narrow periosteal connections, and saw or cut off sharp points of projecting spicula (LONGMORE). Dress the wound with lint soaked in carbolized oil, and support the

WOUNDS AND INJURIES.

SHOT FRACTURES.

Continued.

limb by a fenestrated splint of gypsum, or sole leather, or other material capable of being moulded to it, and which will secure rest. Immobility is securely obtained by a triangular cushion and axillary pad interposed between the thorax and the arm.

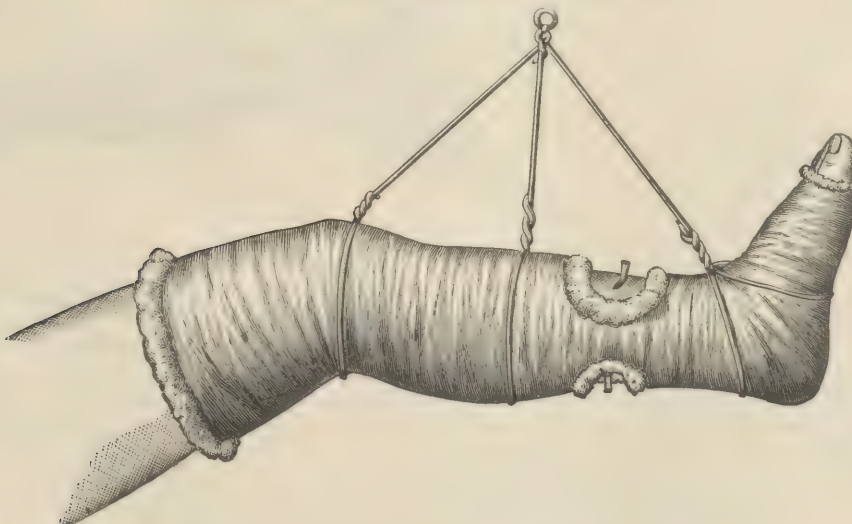
"5. The *radius* and *ulna*, like the humerus, should be conservatively treated, unless there is partial ablation by cannon ball, or comminution of both bones with laceration of the bloodvessels and nerves, or extensive comminution in the vicinity of joints, with fissures extending into the articulations (F. SCHWARTZ). After extracting loose fragments, if no considerable deformity exists, only simple splints and bandages are required; if there is great tendency to displacement, the fenestrated gypsum dressing, applied when the arm is midway between pronation and supination, with a slightly bent elbow, is most useful (H. FISCHER). If a single bone is fractured, the most simple splint dressing is required. Suspension of the forearm in the early stages of treatment is very important, and may be effected by a simple apparatus (G. BUCK). (See Buck's suspension apparatus, Fig. 3885.)

"6. The *metacarpal* and *phalangeal bones* should, as far as practicable, be preserved, whatever the nature of the injury, though their functions may subsequently be greatly limited. Their wounds are extremely painful and troublesome in management, but are not specially liable to induce tetanus (F. G. OTIS). In the treatment, splinters and foreign bodies should first be removed; free incisions through the aponeurotic layers are important in preventing accumulations of matter under fasciæ and tendons, or relieving tension caused by such collections. Carbolyzed oil dressings pressed into the wounds in ordinary cases, and the hot water in those liable to extensive sloughs, should be early resorted to and persistently used; the hand may be supported upon properly adapted splints.

"7. In *shot fractures of the upper third of the femur*, especially if it be doubtful whether the hip-joint is implicated or not, the question is still open whether excision of the injured portion, or removal of the detached fragments and relying on the natural efforts for union, or amputation, which is very dangerous, is best for the safety of the patient. The decision must depend upon the extent of the injury to the surrounding structures, the condition of the patient, and other circumstances in each individual case. As a general rule, in fractures of the middle and lower third of the thigh, amputation is held to be a necessary measure. When it is determined to attempt to save the limb, the wound may be enlarged to remove spicula of bone, and occasionally counter openings should be made to prevent the accumulations and burrowing of pus; carbolic solutions should be injected into all the recesses, and carbolyzed oil on lint be introduced with forceps to avoid creating additional irritation; cold water or ice dressings may at first be applied, to be discontinued if suppuration occurs. The part should finally be perfectly immobilized by apparatus.

"8. The *tibia* and *fibula*, fractured without implication of the knee or ankle joints, are very amenable to conservative measures, and hence, as a general rule, ordinary fractures below the knee, from rifle balls, should never cause primary amputation (T. LONGMORE). The treatment should consist in freeing the wound of all foreign matters and splinters, the local use of carbolyzed oil on lint, and the application of the gypsum splint noticed in the treatment of ordinary compound fractures in this region."—"Operative Surgery." Stephen Smith.

FIG. 3974.—Fenestrated Plaster of Paris Dressing.



For Fixation and Through Drainage in Compound Fracture.

WOUNDS AND INJURIES.

SHOT FRACTURES OF THE LOWER EXTREMITIES.

Thigh and Leg.

FIG. 3975.
Smith's Anterior Splint.

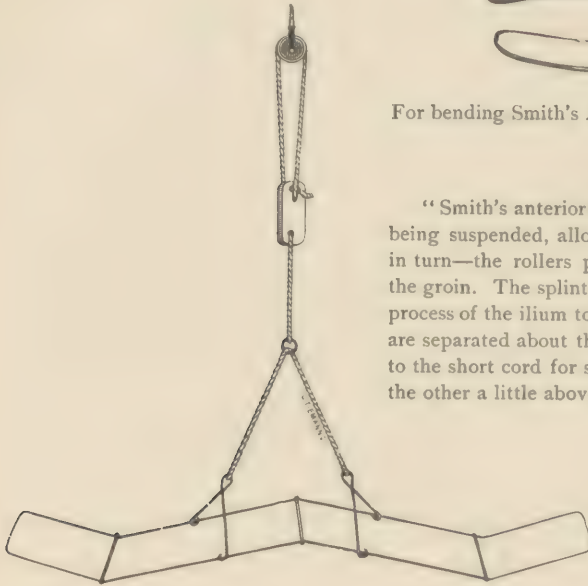


FIG. 3976.—Shrimpton's Forceps.



For bending Smith's Anterior Splint while *in situ*, to adapt it to the limb.

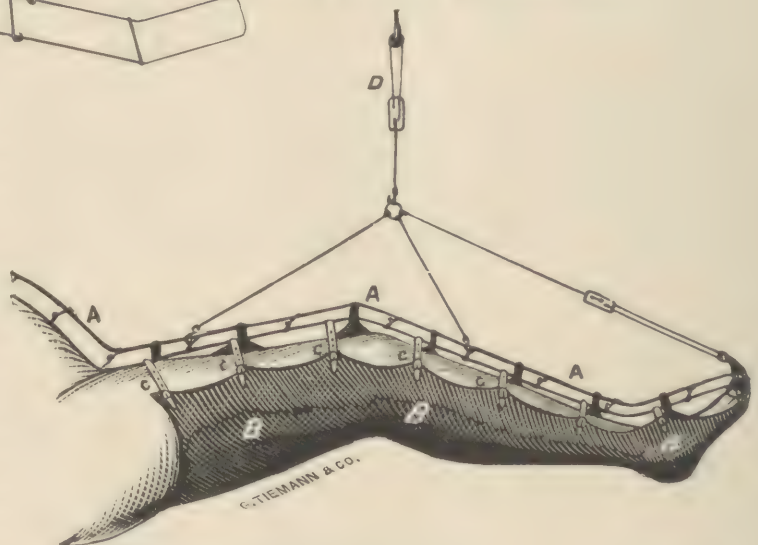
"Smith's anterior splint is simply a frame composed of stout wire, which, being suspended, allows the limb, fastened to it by rollers, to be suspended in turn—the rollers passing around both limb and splint, from the foot to the groin. The splint should extend from above the anterior superior spinous process of the ilium to a point beyond the toes. The lateral bars of the splint are separated about three inches. One of the spring double hooks, fastened to the short cord for suspension, ought to be nearly over the seat of fracture, the other a little above the middle of the leg.

FIG. 3977.
Byrd's Wire Gauze and Smith's Splint.

"*BBB* represents the wire-gauze applied. Dr. Smith's anterior splint is clearly seen above, at *AAA*. The cords and pulleys are sufficiently well defined to be readily recognized.

"After taking proper dimensions of the thigh, popliteal region, leg and heel, the gauze is cut so as to adapt it to the posterior and lateral surface of the limb, and then bound around with thin fine leather, with buckles and straps attached at suitable intervals. The limb is then made nude by the removal of the bandage that sustains the splint, and the wire gauze, as above prepared, placed in position under it. When this is accomplished, the "anterior splint," receiving proper shape, is placed over the front of the extremity, the wire gauze secured by the buckles and straps to its longitudinal bars, and the hooks for the suspensory apparatus above having been passed into the rings or eyelets of the transverse bars of the "splints," the limb is swung from the bed.

"A wound may be clearly seen and freely syringed or sponged, and receive other local treatment through the wire gauze, even when situated on the posterior or lateral aspect of the limb, without disturbing its position. Again, where it is desirable to remove, at any point, undue or uncomfortable pressure, it is more easily accomplished, as the leather straps and buckles attached to the margin of the wire gauze may be slackened or tightened at such points as may be necessary to secure the desired relief. By this management, undue pressure on the muscles may be almost obviated. The foot and heel may be turned to most important account, as a lever or weight in certain fractures, by increasing or lessening the support which the anterior cord and pulley, or sling attached to the distal end of the gauze, is capable of effecting."—HARVEY L. BYRD, M. D.

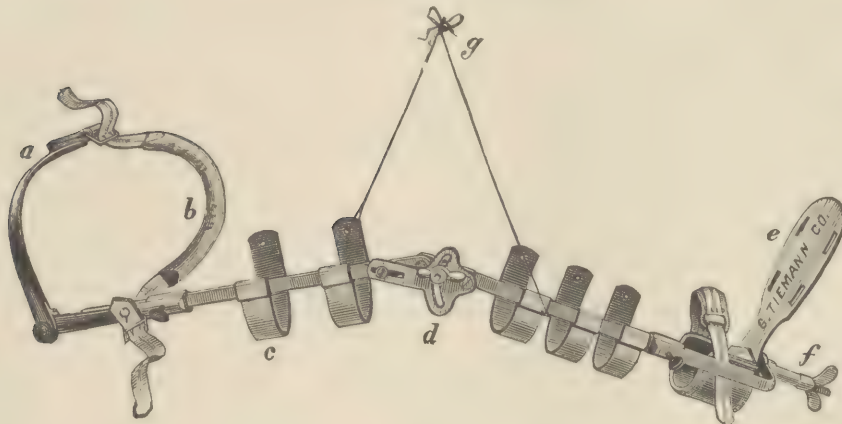


WOUNDS AND INJURIES.

SHOT FRACTURES OF THE LOWER EXTREMITIES.

Thigh and Leg.

FIG. 3978.—Sustaining Splint.



Reversible for Right or Left Limb, Extension, Counter Extension, and Fixation of the Knee at any Angle.

FIG. 3979.—Clendinen's Sustaining Splint.

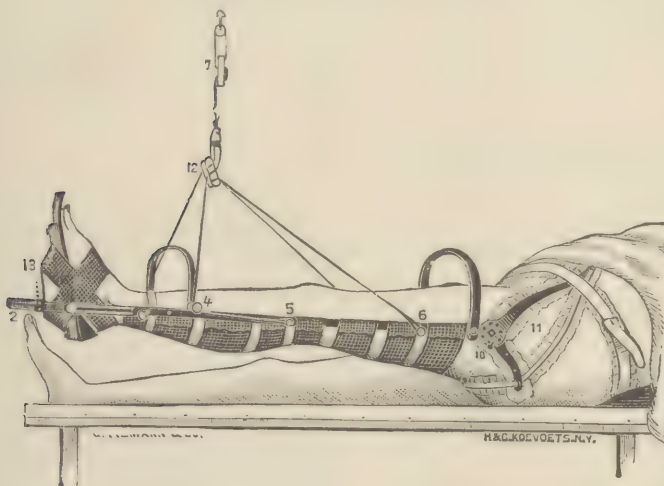


FIG. 3980.
Hodgen's Sustaining Apparatus.



The frame is stout wire; strips of cloth are laid across the splint from side to side, and upon these the limb is laid. The centre and upper extremity of the splint are kept asunder by strong bows of iron wire, so arranged that they can be put on or taken off without disturbing the dressings. When applied, the inside wire must be bent upwards at its upper extremity, so as to make room for the pubes. Extension is made by adhesive plasters, and the whole apparatus is finally suspended to the ceiling or to some point above by a rope and pulley.

WOUNDS AND INJURIES.

OF JOINTS.

Wounds.

"*Joints* are composed of the two ends of bones covered with cartilage; of a sac, frequently containing many appendages, pockets and bulgings; of a synovial membrane, a fibrous capsule, and the strengthening ligaments (T. BILLROTH). It is owing to the intimate relations of these complicated structures that the injuries and diseases of joints are peculiarly serious.

On account of their exposed positions joints are specially liable to wounds of various forms and degrees of severity.

"1. *Contused wounds* may be so severe as to be followed by extravasation of blood into the tissue around it, or even into its cavity. Examine first for a fracture, then apply apparatus to secure perfect rest, and the ice-bag to prevent inflammation; the gypsum dressing with a suitable fenestrum at the joint is the best apparatus for the injury of joints of the lower extremity.

"2. A *punctured wound* is dangerous, owing to the tendency to suppurative inflammation and the retention of the pus. That the joint is involved is known by the escape of synovia. Pursue the following treatment: Place the patient in bed, close the wound with collodion or adhesive plaster, if it is slight, but with sutures accurately applied if it gape; secure perfect rest to the joint by immovable apparatus, and, if any application is made, use cold. In favorable cases all excitement about the joint will subside in a few days, and when the dressings are removed, at the end of four to six weeks, recovery will be complete (T. BILLROTH).

"3. An *incised wound* is also recognized as having penetrated the joint by the appearance of synovia. Such a wound must be treated and dressed antiseptically; close it accurately with sutures, apply immovable apparatus to the limb, and locally use ice-bags; give cooling regimen. If the case proceed favorably, retain antiseptic dressings until union is firm, then commence passive motion, but restrict it for at least one month.

"4. A *lacerated wound* should be treated as follows: Cleanse the wound of all foreign matters under the spray, pare the edges of all contused tissues, and, if possible, close the wound with silver wire sutures and treat it as an incised wound; if large, gaping, and if it cannot be closed under the carbolic spray, enlarge the opening wherever it is necessary to gain free drainage of the cavity of the joint, inject carbolic solutions (1 to 20) to destroy septic ferments which may have entered the joint; introduce the drainage tube or a horsehair drain, carbolized; apply antiseptic dressings and immobilize the joint by apparatus; renew the dressings within twelve hours, and repeat them as often as necessary to prevent accumulation of secretions in the wound (J. LISTER). However favorably the case proceeds, the joint must be retained in a state of perfect rest for at least two weeks, when passive motion may be begun; but, if it produces any swelling of the joint or tenderness, all motion must cease for several days, when it may be renewed."—"Operative Surgery." Stephen Smith.

Dislocation and Luxation.

"A joint is dislocated when one bone is displaced from another at its place of natural articulation; there may be no other injury than rupture of the capsule, simple dislocation; or there may be a wound of the integument entering the joint, compound dislocation. The signs of dislocation are: preternatural immobility and tendency, when reduced, to remain; but with free motion without crepitus. The treatment required is immediate reduction; anæsthetics must be used for relaxation: when reduction is possible by manipulation this method should always be preferred. If more force is necessary, make extension and counter extension with the hands, aided with bandages tied in the form of the clove-hitch; if more power is required, resort to mechanical contrivances, as the pulley. Compound dislocations are among the most serious accidents which can befall a limb (T. BRYANT); but it must be borne in mind that, by the proper use of antiseptic dressings, these injuries may now be treated without suppuration, and are, therefore, far more amenable to conservative measures than formerly. The treatment must depend upon the amount of injury in each case; if slight, reduction may be effected by suitable enlargement of the wound, followed by thorough cleansing and disinfection; resection should be made when the bones are destroyed, the antiseptic dressings being employed; amputation will be necessary when the principal artery of the limb is ruptured, or there is destruction of the tissue about the joint, or the patient is old and feeble."—"Operative Surgery." Stephen Smith.

FIG. 3981.—Dislocation Pulleys.



WOUNDS AND INJURIES.

OF JOINTS.

Dislocation and Luxation. (Continued.)

"The *temporo-maxillary* joints are dislocated by the displacement of the condyles of the lower jaw forwards, one or both, the latter being more frequent. Reduce as follows: The patient, seated on the floor, with the head between the knees of the operator, place a couple of pieces of cork, gutta percha or pine wood as far back between the molars as possible; now draw the chin steadily upwards, taking care not to draw it forward at the same time; or, sitting or standing in front, depress the condyles by means of the thumbs protected by pieces of leather, placed on the top of the molars; if this method fail, reduce one side at a time, or give an anæsthetic; after reduction support the jaw with a bandage.

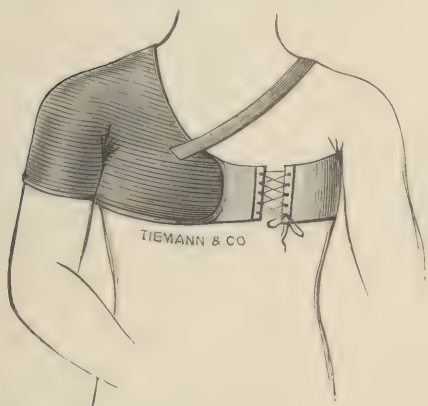
"The *vertebral articulations* are rarely displaced without fracture, especially in the lumbar and dorsal regions. In the cervical region forward and backward luxations may occur with or without fracture. Reduction should always be attempted. If the lumbar or dorsal vertebræ are displaced, make forcible extension with judicious lateral motion and direct pressure upon the spine. If a cervical vertebra is displaced, raise the head firmly by the chin and occiput, and, if reduction does not follow, add slight rotation in the direction of dislocation to disengage the process, or place the patient on the back and make extension in the same manner.

"The *sterno-clavicular joint* may be dislocated by the displacement of the end of the clavicle forward, upwards or backwards. Reduction is effected by elevating the shoulder in pushing upward at the elbow, or by drawing the shoulders backward and upward with the knee pressing against the spine between the scapula. Though frequently it is difficult to retain the clavicle in position, the function of the arm is rarely impaired. For the first and second forms, the pad in the axilla, the sling for the elbow, and a pad upon the displaced bone, retained by adhesive straps, are most useful; for the third form, rest on the back, or such appliance as will retain the shoulder upwards and outwards, are required.

"The *acromio-clavicular joint* may be luxated by the upward or downward displacement of the end of the clavicle; reduction is effected by drawing the shoulder outward and backward. The retaining apparatus for the upward luxation should be applied as follows (W. T. BULL): Place a compress over the articulation, and retain it by two strips of adhesive plaster, the edges being glued to the skin by collodion; bandage the hand and forearm with a flannel roller; apply a loop of elastic bandage (H. A. MARTIN), five feet long and one inch and a half wide, passed under the elbow of the injured side; draw the ends snugly over the compress, carrying the anterior one around the axilla of the sound side, as in a spica of the shoulder, to join the other between the clavicles, where they are fastened with strong pins. Complete and permanent restoration rarely follows any treatment (F. H. HAMILTON)."—"Operative Surgery." Stephen Smith.

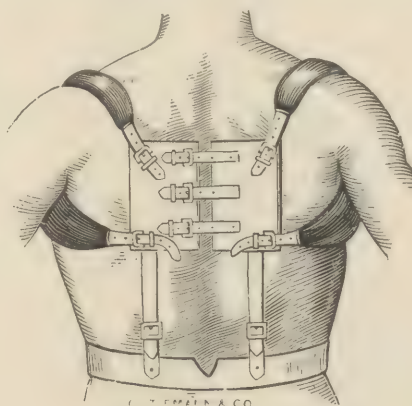
"Dislocation at the shoulder joint may be very conveniently reduced by causing the patient to mount to a convenient height on some 'steps,' placing his arms across the top step, upon which is placed a pillow. The top step acts as a fulcrum, and the weight of the patient's body answers to a great extent as counter extension."—Dr. G. HAMILTON.

FIG. 3982.—Apparatus for Preventing Dislocation of the Shoulder Joint.



This apparatus is to be worn after reduction of a dislocated humerus, to guard against a recurrence, and also for the purpose of relieving permanent dislocation arising from a laxity of the ligaments, or from paralysis of the deltoid and scapular muscles. It is made of satin-jean, with a leather shoulder-cap.

FIG. 3983.—Sir Astley Cooper's Apparatus for Dislocated Clavicle.



DIRECTIONS FOR MEASUREMENT.

1. Right or left shoulder? Inches,
2. Circumference of the arm, "
3. Circumference axilla to acromion, "
4. Circumference of chest under axilla, "

WOUNDS AND INJURIES.

OF JOINTS.

Dislocation and Luxation. (Continued.)

FIG. 3984.—Smith's Clavicle Apparatus.



FRONT VIEW.



BACK VIEW.

"This splint is very simple, easily made, and not expensive. It is a gauntlet-shaped piece of leather, laced to fit the forearm, running on either side back of the bend of the elbow. To this part is attached a strap and buckle. A padded collar with strap, buckle and ring is fitted to the uninjured shoulder. Through this ring the strap from the elbow piece passes, and by tightly drawing this strap the arm of the injured shoulder is under sufficient control to bring the fragments into perfect apposition. A sling is made to pass from the ring of the collar on the uninjured side of the neck for the hand of the injured side. I claim that for fracture of the clavicle, oblique, downward, and inward, and through the great convexity of the bone, my splint has all the advantages of any other as well as some (advantages) that no other splints have."—"Original Deductions, based on a Study of One Hundred Cases of Fractures of the Upper Extremities, excluding the Hand." Samuel W. Smith, M.D.

FIG. 3985.—Mayor's Apparatus for Dislocated Clavicle.



The outer or acromial end of the clavicle is not unfrequently dislocated upwards and more rarely it is driven fairly over the acromion process, constituting a dislocation upwards and outwards. This dislocation is easily reduced, but the clavicle is with difficulty retained in place. The treatment consists in the application of a force over the top and outer end of the clavicle, with a counter-force applied below the elbow, so as to elevate the humerus and scapula, while the arm and forearm are confined by a sling and bandage against the side and front of the body.

WOUNDS AND INJURIES.

OF JOINTS.

Dislocation and Luxation. (Continued.)

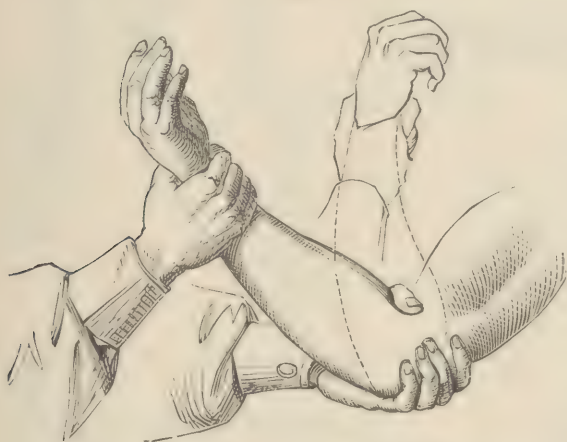
"*The shoulder-joint dislocations* consist of displacement of the head of the humerus: First, downwards into the axilla; second, forwards under the caracoid process; third, backwards under the spine of the scapula. The reliable sign of these displacements is the projection of the elbow from the chest when the hand of the dislocated arm is placed upon the opposite shoulder. The method of reduction in the first two varieties is the same; proceed as follows: Flex the forearm upon the arm, and while the arm is elevated to a right angle with the trunk, rotate gently forwards by depressing the hand and forearm; or place the knee in the axilla to press the head outward and serve as a fulcrum and use the shaft as a lever: or laying the patient down place the heel against a pad in the axilla, and grasping the wrist and elbow make steady traction, meanwhile prying the head outward with the heel failing, give an anæsthetic (F. H. HAMILTON).

"Reduction may also be effected by manipulation: Grasp the shoulder with one hand and the flexed elbow with the other, make extension at the elbow, drawing it from the side with slight rotary motion outwards; when extension is fully made, raise the elbow and with the arm describe a semicircle towards the sternum and face, then suddenly depress the elbow upon the thorax, rotating the head of the humerus inwards, and with the thumb of the right hand giving proper direction to the head; this manœuvre may be repeated if necessary (H. H. SMITH).

"In the subspinous form make extension towards the joint, or resort to the last method—standing behind the patient and drawing the elbow backward and rotating the bone, while the thumb of the right hand guides the head to the joint. Or let the operator place the injured arm at right angles to the body, and standing against it, with his side to the patient and his hips pressed firmly, but not roughly, into the axilla, fold the arm and hand of the patient closely round his pelvis, and fix the hand firmly by pressing it against the crest of his ilium; reduction is effected merely by a rotation or version of the surgeon's body, with a force and rapidity which necessarily vary with the peculiarity of the dislocation—some yielding most readily to a sudden and powerful effort, and others to gentle and gradually increasing traction (I. E. KELLY).

"In compound dislocations the question as to reduction or resection should be decided as follows: In a healthy patient, without complications, reduction is preferable; but if the patient is weak or old, or the exposed bone is badly injured, or the parts are much lacerated, saw the exposed head of the bone (T. HOLMES). Antiseptic dressings should be scrupulously applied.

FIG. 3986.



"*The elbow joint* may be dislocated by displacement of the ulna and radius backwards, forwards, inwards, outwards, the last two being partial. Examine carefully to determine whether there is a transverse fracture of the humerus, or of one condyle, or of the olecranon. Reduce the first form thus: the patient seated in a chair, press the knee in the bend of the elbow and flex the arm forcibly but slowly around it (Sir A. COOPER, F. H. HAMILTON). Other methods are as follows: the patient being seated, carry the arm and forearm directly backwards, the scapula being pressed forwards (R. LISTON, I. MILLER); extension of the forearm from the hand or wrist downwards (T. C. SKEY); extension of the forearm from its middle by an assistant, while the surgeon seizes upon the olecranon process with the fingers of one hand, and, placing the palm of the other against the front and upper part of the forearm, pulls forcibly backwards (J. PIRRE). The second form may be reduced by forced flexion aided by pressure; the lateral displacements are

restored by moderate extension combined with lateral pressure (F. H. HAMILTON). The head of the radius may be displaced separately forwards, outwards and backwards, the first being far the most frequent; reduction is effected in all forms by extension aided by pressure upon the head of the radius made in the right direction. In compound dislocations in healthy patients, reduce the bones and close the wound antiseptically, unless there is much comminution, when excision of the bones involved should be performed; in general, a useful limb results from these excisions of the joint surfaces.

"*The wrist joint* is luxated by displacement of the carpus forwards or backwards; reduction is made by extension in a straight line, with slight rocking or lateral motions if necessary."—F. H. HAMILTON.

"*The phalangeal joints* may be dislocated, and are generally easily reduced. The displacement of the first phalanx of the thumb upon its metacarpal bone is an exception; the difficulty of reduction is due to the escape of the head of

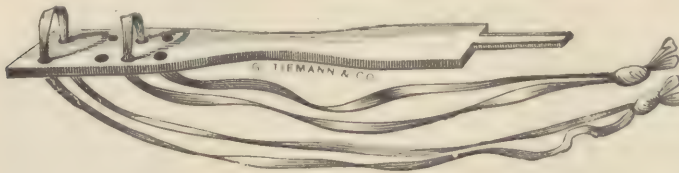
WOUNDS AND INJURIES.

OF JOINTS.

Dislocation and Luxation. (Continued.)

the metacarpal bone between the two tendons of the flexor brevis, where it is lodged as in a buttonhole (FABBRI). Reduction is effected by first pressing the metacarpal bone firmly to the centre of the palm, to relax the short flexor, then putting the displaced phalanx in a state of extreme extension to relax the tissues of the buttonhole and to push up those which form its distal part over the projecting head of the metacarpal bone; this is done by dragging the hyper-extended thumb downwards or away from the wrist, and then acute flexion will restore it to its place (T. HOLMES). If this remedy fail, with a very narrow-bladed tenotome divide the insertions of the flexor tendon and repeat the manœuvre."—"Operative Surgery." Stephen Smith.

FIG. 3987.—Levis' Splint, for Reducing Dislocation of Phalanges.



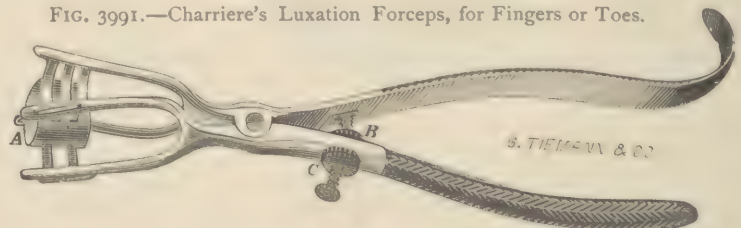
To apply this instrument: The finger is passed through the loops, and, by drawing on the tapes and then winding them around the projecting stem in opposite directions, and finally tying them together, a firm grip is obtained. This enables the operator to apply both extension and flexion, or leverage in any direction. The proximal end of the phalanx may be lifted, or even rotated, so as to allow one side of the bone to approach the socket before the other. It is a simple and cheap instrument, but one that every surgeon ought to possess. Fig. 3988 represents it applied.

FIG. 3988.—Levis' Splint applied.



This instrument (Fig. 3990) is made in the shape of a pair of forceps, the strong jaws of which, in place of being concaved, are bifurcated, and carry between their rods straps of strong webbing, doubled and drawn over them; *A*, the spaces, being filled up by slices of cork or india-rubber. This construction and the length of the arms of the lever, exercise sufficient power to seize and hold the luxated member without contusing the soft parts.

FIG. 3991.—Charriere's Luxation Forceps, for Fingers or Toes.

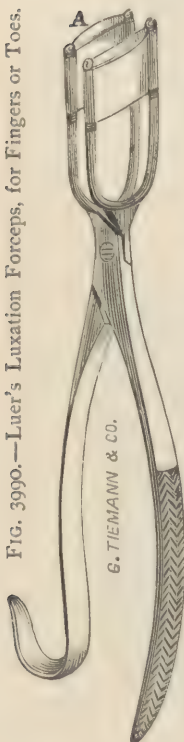


This pair of forceps is jointed like a compass. The jaws consist of forks of two stems each, equi-distant, to which four leather straps are fastened, intercrossing each other in such a manner as to form a double floating knot, *A*, that opens or shuts as the handles of the forceps are approached or separated. The action of this double knot is regulated by a screw and two nuts, *C*, *B*, enabling the operator to diminish, augment, or fix the amount of pressure at will.

FIG. 3989.—Plain Luxation Forceps.



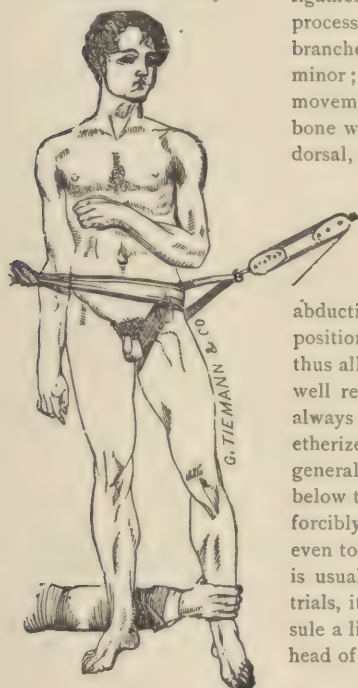
FIG. 3990.—Luer's Luxation Forceps, for Fingers or Toes.



WOUNDS AND INJURIES.

OF JOINTS.

Dislocation and Luxation. (Continued.)

FIG. 3992.
Dislocation Pulley.FIG. 3993.
Bigelow's Apparatus, for Reduction of Dislocation
on the Dorsum Ilii by Vertical Extension.

"The hip joint is protected and strengthened by the ilio-femoral, or inverted Y ligament, which is inserted above into the front and outside of the inferior spinous process of the ilium, and below the anterior inter-trochanteric line; it has two main branches, the outer extending to the trochanter major and the inner to the trochanter minor; in regular dislocations this ligament is unbroken and controls largely the movements of the head of the femur. The several positions of the head of the bone with reference to the socket may be reduced to the following, namely: *a.* The dorsal, including that on the tuberosity, the everted dorsal, the anterior oblique and the supra-spinous; *b.* The thyroid, including that on the perineum and on the thyroid foramen; *c.* The pubic, the pubic and sub-spinous. Though the head of the bone may be primarily luxated in various directions, yet the downward dislocation is by far the most common, as the capsule is thin and weak at this part, and flexion, by which the ligament is relaxed, with adduction or

abduction, is the habitual attitude of the thigh in action and self-defence. From this position the head of the bone readily passes to the dorsal, or thyroid, or pubic regions; thus all regular dislocations may be secondary. These several positions are sufficiently well recognized for reduction by the following sign, namely: the head of the femur always faces the same way as the internal condyle. As a preliminary to reduction, etherize the patient to relaxation, and place him recumbent on the floor. The best general rule for reducing a recent dislocation is to get the head of the femur directly below the socket by flexing the thigh at about a right angle, and then to lift or jerk it forcibly up into its place. This rule applies to all dislocations except the pubic, and even to that when secondary from below the socket; the reduction by the lifting method is usually instantaneous, and flexion is the basis of its success. If, after one or two trials, it appears that the bone cannot be jerked into place, enlarge the rent in the capsule a little by moving the flexed thigh from one side to the other, so as to sweep the head of the femur across below the socket, and again repeat the act of lifting. The

following rules for reduction of the femur from its several positions should be observed: 1. In *dorsal dislocations*, flex and forcibly lift; if this effort fail, flex and lift while abducting. If this fail, it will be found that abduction has carried the head of the bone from the dorsum nearly or quite to the thyroid foramen, and that the capsular rent has been so enlarged that the first method may now prove successful; 2. In *thyroid dislocations*, adduction of the flexed thigh reverses the movement and carries the head from the thyroid foramen to the dorsum, and also enlarges the opening, making the first rule effective; 3. The *pubic dislocations* may generally be brought down without difficulty from above the socket, after flexion, especially if they are secondary, and may then be reduced from that position like the thyroid.

"A fulcrum made by rolling one or more sheets into a firm band, two or three inches in diameter, may aid the manipulator. Place the centre of the band in the groin, and, while assistants raise the ends by pressure at the knees, the head is lifted into the socket. The same result is secured by requiring an assistant to lift the head of the bone by means of a stout sheet in the groin and over his shoulders."—"Operative Surgery." Stephen Smith.

"In reducing a dislocation of the hip by manipulation it is important to bear in mind that, in every position, the head of the femur faces nearly in the direction of the inner aspect of its internal condyle."—"Mechanism of Dislocation and Fracture of the Hip." Bigelow. 1869.

WOUNDS AND INJURIES.

OF JOINTS.

Dislocation and Luxation. (Continued.)

"The *patella* may be displaced outwards, inwards, or on its own axis; reduction is made by laying the patient on the floor, lifting the limb with the heel upon the shoulder so as to relax completely the quadriceps muscle, and pushing the patella into position; if this effort fails in the last form, flex the thigh and straighten the leg while pressure is made on the patella (T. HOLMES).

"The *knee joint* is dislocated by displacement of the tibia backwards, outwards and inwards, but in general the luxation is incomplete. Reduction is generally effected without much difficulty. If backwards, use forced and extreme flexion; if forward, reverse the movement; if lateral, make extension and pressure.

"The *ankle joint* is luxated by the displacement of the tibia forwards and backwards. Reduction is effected by extension and counter extension combined with pressure. Division of the tendo Achillis has been found necessary in cases of backward luxation. Dislocation outwards or inwards is a rotation of the astragalus, accompanied usually with a fracture of the fibula and rupture of the internal lateral ligament (F. H. HAMILTON). Compound dislocations are not infrequent at the ankle joint, and always demand the most judicious care; as in other compound dislocations the conditions present must determine the course of procedure. By conservative measures in young and healthy persons, where the vessels have escaped damage, and there are no other serious complications, the limb and joint may often be saved. The wound should be cleansed of all foreign matters, carbolic solutions (1 to 20) should be injected into all its recesses, and antiseptic jute or cotton, soaked in carbolized oil, applied to the opening; the joint must be immobilized by the fenestrated gypsum bandage, unless there is great swelling, when the splint must be used. Ankylosis will ensue, but the increased mobility of the transverse tarsal joint will in a great measure compensate for this loss (T. HOLMES). When there is much comminution, removal of the fragments is necessary, or excision of the joint may be required, followed by the dressings already given. In a certain proportion of cases, the injury, or health, or age of the patient, renders amputation the only safe course.

"The *tarsal bones* may be luxated from their position, but generally the great violence which causes such displacement does severe injury to the tarsus. Luxations of the astragalus are far the most important; the dislocations of this bone may be forwards, backwards, outwards and inwards, or it may be rotated on its axis. As a rule, if the dislocation is simple, attempt immediate reduction; if the luxation is complete and reduction impossible, resect; if the luxation is compound, resect; if there is severe laceration, or other injuries complicating these conditions, amputate. Reduction is effected by extension from the foot, grasped as in removing a boot, and counter extension from the knee, with such pressure upon the displaced bone as may be required. If the astragalus is displaced from the scaphoid and calcaneus the treatment is the same."—"Operative Surgery." Stephen Smith.

Resection and Excision.

"The terms resection and excision are frequently used as synonymous; but, though the definitions of the two words are not unlike, there is a different and distinct meaning attached to each when properly employed. *Resection* strictly implies the removal of the shaft of a long bone, while *excision* means the removal of the joint ends of bones, or the extirpation of a short, flat or irregular bone. The great improvements in the use of antiseptics has enlarged this field of useful operations. It is possible now to avoid many of the former dangers of excision (such as excessive suppuration) and secure rapid union of bone. The former statistics of the results of these operations before antiseptics were scientifically employed are now of only historical value.

"The *indications* for these operations are in general as follows: *a.* Resection of bone, in part or whole, is required after injuries which have destroyed its vitality, or after diseases which have resulted in caries or necrosis, or in the removal of tumors; but the operation is justifiable only when it is evident that resection is preferable to every other remedial measure (T. C. SKEY). When undertaken it must be so planned and executed as to become the first step in a process of repair by which a part is restored to more or less complete usefulness that would otherwise have been sacrificed (A. WAGNER). The operation must be determined by the condition of the patient and of the diseased part. In general the operation is indicated only when the general health admits; for, if the patient is suffering from a progressive wasting disease, as tuberculosis or marasmus, which will necessarily prove fatal, resection would be unwise, as repair would not follow (T. BILLROTH). In injuries, as gunshot, only such fragments of bone should be removed as are nearly or quite detached from the periosteum. In caries of hollow bone the ulcer may be thoroughly cleaned out with the sponge and the cavity be allowed to close by granulation (C. SEDILLOT); but, if the bone is small, extirpation may be necessary to arrest the process at once (T. BILLROTH). If a hollow bone is affected throughout, as with periostitis, external and internal caries, partial internal and external necrosis, extirpation of the entire bone may be required as the only alternative of amputation (T. BILLROTH). Tumors of bone, if not malignant, must be removed from their locality; but, if malignant, extirpation of the bone or wide resection is necessary (SIR J. PAGET).

"*b.* *Excision* of a joint is necessary for shot injuries, the comminution of the joint ends of the bones, or the im-

WOUNDS AND INJURIES.

OF JOINTS.

Resection and Excision. (Continued.)

paction of a ball in the end of the bone in such manner that it cannot be removed without destruction of the bone ; in compound dislocation with extensive injury of the soft parts, or complicated with fracture ; in caries which has destroyed the articular surface, and continues to progress in spite of well directed efforts to control it.

"Compound dislocations and fractures involving joints, once so fatal from inflammation, do not always necessitate excision, for, when antiseptic methods are rigidly enforced from the first, suppuration does not occur.

"The *time* of operating after an injury, as a gunshot, should, if possible, be within twenty-four hours of the accident, or primary ; if it is delayed beyond this period, it should not be performed until the intermediary stage of inflammation is passed (G. A. OTIS). If the bone is necrosed, the invariable rule should be not to attempt removal before complete detachment, because the dead bone can rarely be sawed out without removing healthy and newly-formed bone, and the new bone is not firm enough before the sequestrum is detached (H. J. BIGELOW).

"The *instruments* required in resection may be few or many, both in number and variety, according to the nature of the case."—"Operative Surgery." Stephen Smith.

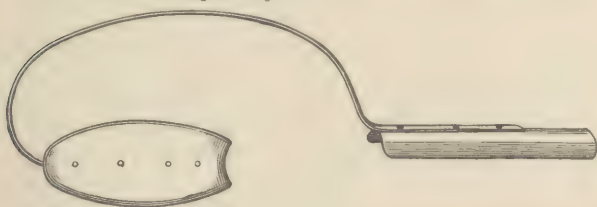
See OSTEOTOMY, page 100 ; RESECTION AND EXCISION, page 104 ; BRACKETS AND SPLINTS, below.

"Present experience indicates that excision should be had recourse to whenever the injury or disease is of a nature to destroy the function of the joint and require ankylosis to render the limb useful. It is generally undertaken for chronic affections which cause ulcerative processes within the joint. The antiseptic method has relieved the operation of all its former dangers. It is no longer a question of age, or sex, or even physical health ; but the decision should rest entirely upon the determination of the nature of the disease and its final results upon the usefulness of the limb."—"Operative Surgery." Stephen Smith.

Brackets and Splints for Securing Immobility.

FIG. 3994.

Esmarch's Interrupted Splint, for Excision of the Wrist.



"Esmarch's interrupted splint, for excision of the wrist (Fig. 3994), consists of a piece of sheet iron for the hand and a tin splint for the dorsal surface of the forearm, which are connected with one another by a strong iron bar, shaped like a bow. As the wrist remains exposed for some distance, this apparatus is especially suitable for the antiseptic treatment of wounds."—"Surgeon's Hand-book." Esmarch.

FIG. 3995.—Esmarch's Interrupted Splint Applied.

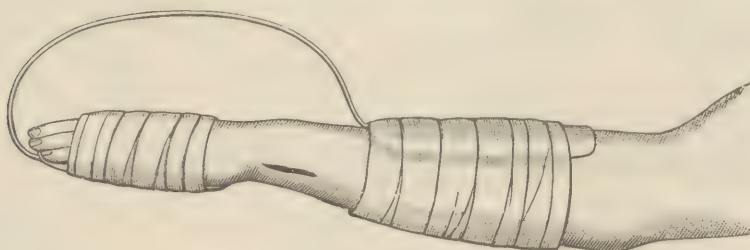
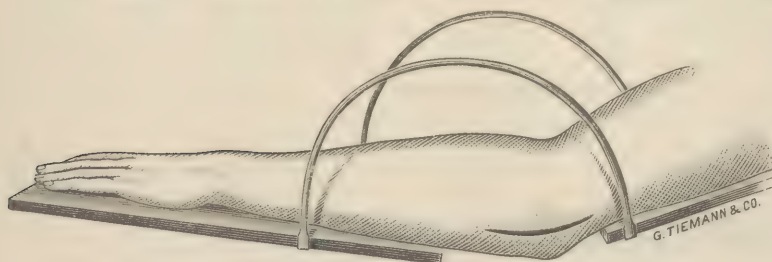


FIG. 3996.—Esmarch's Splint, for Excision of the Elbows.



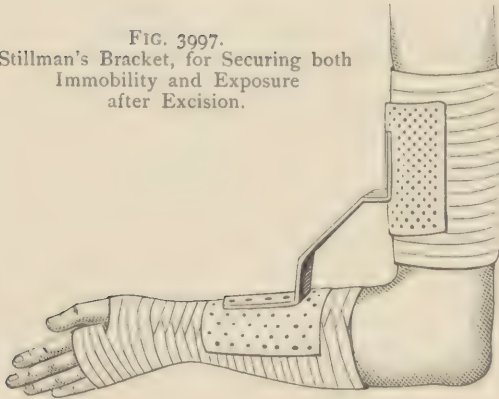
"I call it the 'Langensalza' splint, because I made it for excisions at Langensalza, in 1866, when I came from Berlin on a visit to Stromeyer. This splint is easily made, and is as good for the open dressings as it is for the antiseptic method."—"Surgeon's Hand-book." Esmarch.

WOUNDS AND INJURIES.

EXCISION OF JOINTS.

Brackets and Splints for Securing Immobility. (Continued.)

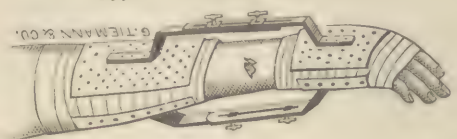
FIG. 3997.
Stillman's Bracket, for Securing both
Immobility and Exposure
after Excision.



The arm being bent at a right angle with the forearm, the plaster is applied from the bases of the fingers to a point as near the joint as practicable, and again above the joint nearly to the axilla.

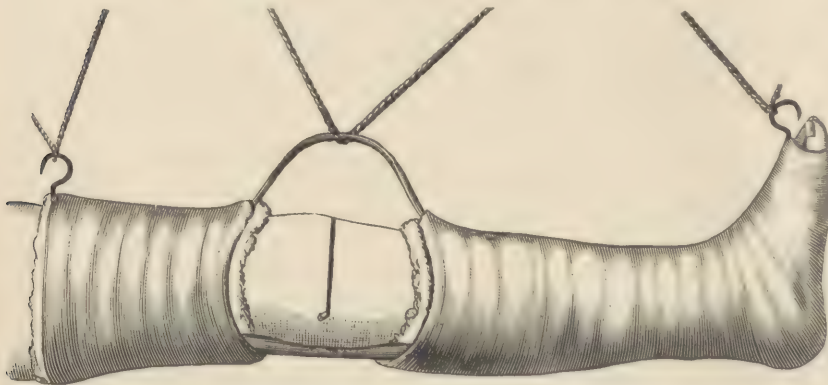
After it has almost solidified the bracket is placed upon layers of plaster paste (see Fig. 3997) and bound down by the other layers of bandage, which are then smeared over with the paste and covered by neat dry bandage. This ensures firm support above and below, and yet allows complete exposure of the surface of the joint.

FIG. 3998.—Stillman's Wrist Bracket.



By encircling the hand (except the fingers) and the forearm with plaster, and applying a bracket anteriorly and posteriorly, as shown in Fig. 3998, we are enabled to retain the wrist in any desired shape and yet keep up extension by means of the ratchets. In the treatment of Colle's fracture and exsections of the wrist they will be found very valuable."—"Mechanical Treatment of Joints. Chas. F. Stillman, M. D. 1878.

FIG. 3999.—Watson's Plaster of Paris Swing Splint.



"The excised knee rests very comfortably and securely in Watson's plaster of Paris swing splint. The leg, enveloped in cotton wool, is first placed upon a wooden splint which has been rubbed with carbolic oil or ointment, and then bandaged firmly on with plaster of Paris rollers, so that the knee remains exposed and is supported only by the narrow wooden bridge beneath.

"The suspension bar (Fig. 4000) is placed upon the anterior surface of the limb, beneath the final turns of the plaster of Paris bandage, and the whole leg is suspended to a cross bar, placed over the bed."—ESMARCH.

FIG. 4000.—The Suspension Bar.

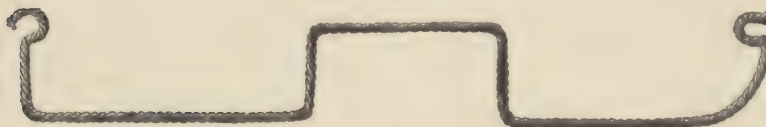


FIG. 4001.—Steel Spikes, for Transfixion of Bones in Exsections.



WOUNDS AND INJURIES.

EXCISION OF JOINTS.

Transfixion of Bones in Exsections.

FIG. 4002.—Wyeth's Drills, with Adjustable Handle.



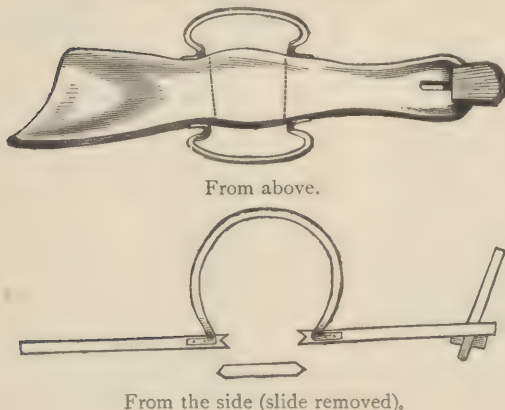
"Steel spikes, for transfixion of bones in exsections, have been much used in late years in this operation and are highly recommended. I prefer the drills, on account of their easier and more accurate adjustment.

"The drills with adjustable handle, for fixation of the bones in knee-joint exsection, have given perfect satisfaction in my service. They vary in length from three to five and six inches, are between one-sixteenth and one-eighth of an inch in diameter, and with the points smaller than the shaft, so that as they are made to enter and transfix the bones they become jammed and are held immovable and secure. Everything being in readiness for the drills, a rubber drainage-tube is carried through the wound, so that, when the bones touch each other, the tube is behind these with an end projecting on each side of the knee, or two short pieces may be inserted from either side. The sawn surfaces of the bones are now brought together, and held perfectly steady by a skilled assistant. The operator approximates the edges of the wound temporarily, fixes the drill into the handle of the instrument, and at a point about one inch or one inch and a half below the end of the tibia, and upon the anterior and lateral aspect of the leg, make a puncture in the skin. In this puncture the point of the drill is carried, passing obliquely down to and into the bone as far as its periosteum. The handle is now removed and a second drill introduced in the same manner from the opposite side of the tibia, crossing the first at about an angle of 90° . A third point is next introduced, on the anterior surface of the femur, and is made to travel almost directly down into the tibia. The bones are now firmly fastened together, and the extremity may be lifted from the foot as if it were ankylosed at the knee. The wound is next closed with catgut sutures, and finally irrigated, dressed with sublimate gauze, and, outside of this, a thick layer of borated cotton, with protective over all. In order to steady the limb, pieces of tin or hoop iron (or a wooden splint) may be worked in as the bandage is being applied, &c."—"Text Book of Surgery." Wyeth.

"The bones must be maintained in apposition by two or three silver wires which should be introduced into the anterior part of the tibia and femur, and, when sufficiently twisted, cut off, and the ends turned down between the bones. Nails have been employed to fix the bones in position, which are removed at the end of two or three weeks. The wires are allowed to remain, but nails must be withdrawn after several weeks."—"Operative Surgery." Stephen Smith.

See Fig. 1627, GAILLARD'S BONE DRILL, FOR TRANSFIXING BONES IN UNUNITED AND OBLIQUE FRACTURES.

Fig. 4003.—Packard's Splint.



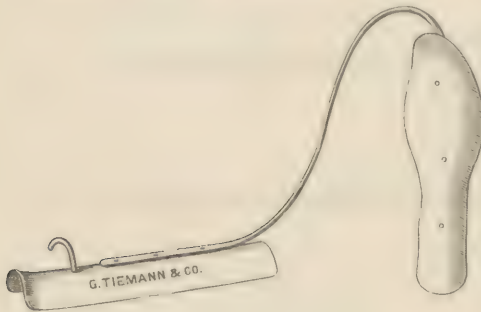
This splint is made of wood. It is hollowed slightly, so as to make a very shallow trough; at the buttock end it is bevelled off, so as not to irritate the skin; at the lower end it is carved out to receive the heel. A slit is mortised lengthwise in the middle line, close to the lower end of the splint, to receive the tenon of the foot-piece. A piece corresponding to the knee is removed and is made to slide in or out. Two strong metal brackets, six to nine inches high, connect the thigh and leg pieces: they are made to flare out, so as to prevent any pressure against the limb in case the latter should swell. Soft leather casings to surround the limb may be tacked on to the splint, which, being well padded, may be secured by means of laces or buckles. To change the dressings, the slide is withdrawn and the leather undone, which leaves the knee exposed. When the dressing is changed the splint is reapplied as above.

WOUNDS AND INJURIES.

EXCISION OF JOINTS.

Brackets and Splints for Securing Immobility.

FIG. 4004.
Esmarch's Splint, for Excision of the Ankle.



"My bracket consists of a splint for the sole of the foot and a narrow dorsal splint for the leg, both made of tinned iron and connected with one another by a dorsal wire bracket. The foot is fastened by strapping and a plaster of Paris bandage to the splint for the sole of the foot, and the leg in like manner to the dorsal splint. The heel can be supported by a triangular handkerchief."—ESMARCH.

FIG. 4005.
Esmarch's Bracket Splint, for Excision of the Ankle, Applied.

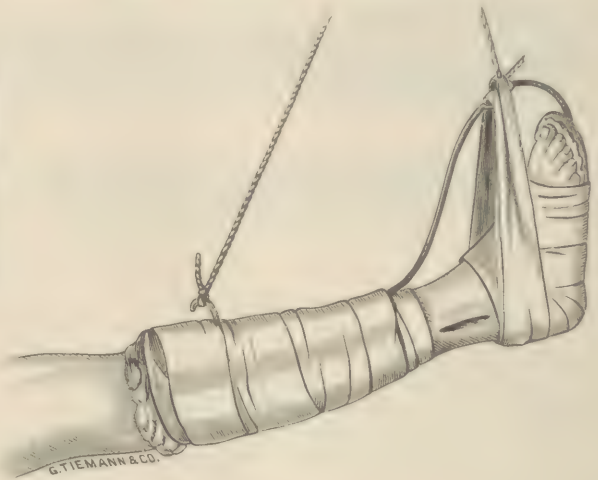
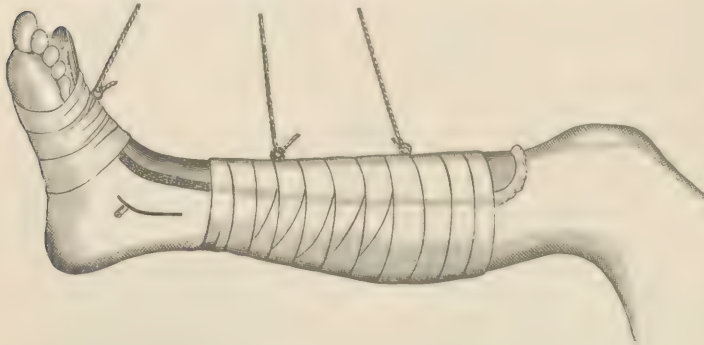


FIG. 4006.—Volkman's Dorsal Splint, for Excision of the Ankle.



"It is constructed of two plates of perforated zinc, connected by a racheted bridge, one inch in width and one-eighth of an inch in thickness, strongly riveted, and bent in the form shown in Fig. 4008.

"The foot being held at a right angle by an assistant, it is carefully wound with plaster from the base of the nail of the great toe as far toward the ankle as consistent with the diseased condition, and, beginning at a corresponding point above the ankle, the leg is encased almost to the knee. After waiting a sufficient time for the plaster to set, a little plaster paste is smeared over the part where the bracket is to be placed, which has previously been accurately fitted to both foot and leg. The bracket is now placed in position and bound down by repeated turns of the plastered bandage, and after smearing the foot and leg with plaster paste, the whole is neatly covered with clean fresh bandage.

"This apparatus maintains the ankle securely, yet leaves the whole surface open for inspection and dressings."—C. F. STILLMAN, M. D.

"Volkman's dorsal splint is made of wood. It is fixed to the foot and leg by plaster of Paris bandages, or moist gauze bandages. It gives good support to the excised joints."—ESMARCH

FIG. 4007. FIG. 4008.
Stillman's Ankle Bracket.

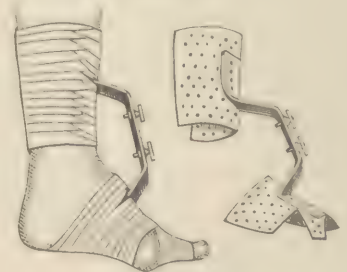


FIG. 4009



WOUNDS AND INJURIES.

EXCISION OF JOINTS.

Fluhrer's Procedure of Wiring Bones.

FIG. 4010.—*a*. Crotchet Drill, two-thirds actual size; *b*. End of Drill, actual size.

"To overcome the difficulties in the wiring of bones, I devised the instruments, and have practiced the procedure described in this paper.

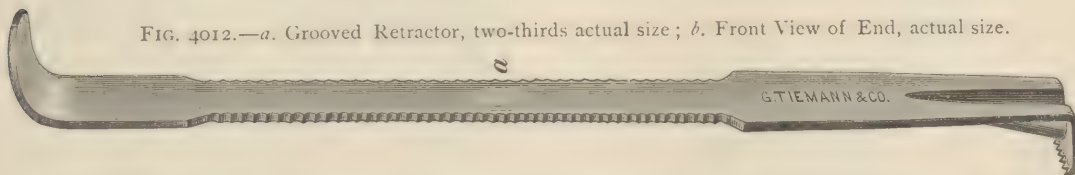
"The *drill*, which is shown in Fig. 4010, *a* and *b*, is made of one solid piece of steel. Its handle is octagonal, one-fourth of an inch in diameter, and four inches long to the shoulder, which tapers quite abruptly to the shank.

"The shank is one-sixteenth of an inch in diameter, two and three-quarters to four inches long, of fine spring temper, and terminates in a flattened head which is a little wider than the diameter of the shank. The peculiar feature of this drill is a shallow notch cut into one side of the head and forming the end into a hook. It is important that the notch shall not be made too far from the point, that it shall not be too deep, that the side of the head beyond it shall have exactly the shape shown in the figure, and that, whatever the other dimensions of the drill, it shall always be constructed just as described. Three transverse grooves upon the handle, near the shoulder, are an index to mark its position with reference to the circumference of the instrument.

FIG. 4011.—Fork, two-thirds actual size.



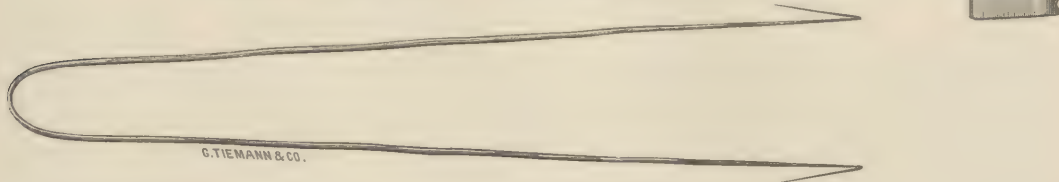
"The *fork* is shown in Fig. 4011. It is also made of one solid piece of steel, and is finally annealed. Its flattened handle, four inches long, is continuous with the shank, also four inches long, which gradually tapers to a diameter of one-eighth of an inch, and which terminates in a double fork. The prongs of the primary fork are three-eighths of an inch long, and at their ends are notched one-eighth of an inch deep, forming secondary forks.

FIG. 4012.—*a*. Grooved Retractor, two-thirds actual size; *b*. Front View of End, actual size.

"The *grooved retractor* is made of German silver, or other metal, and is shown in Fig. 4012, *a*, *b*.

"The instruments described are made from my own models, by George Tiemann & Co., of New York.

FIG. 4013.—Wire Suture, two-thirds actual size.



"The *wire* is of pure silver, annealed. It is used of different thicknesses, and, if practicable, it should be large enough to nearly fill the drill hole. A large-sized wire is not apt to cut through the bones, and forms a strong bond of union between them. The ends of each length of wire are tapered for about two inches, and bent at an acute angle, as shown in Fig. 4013.

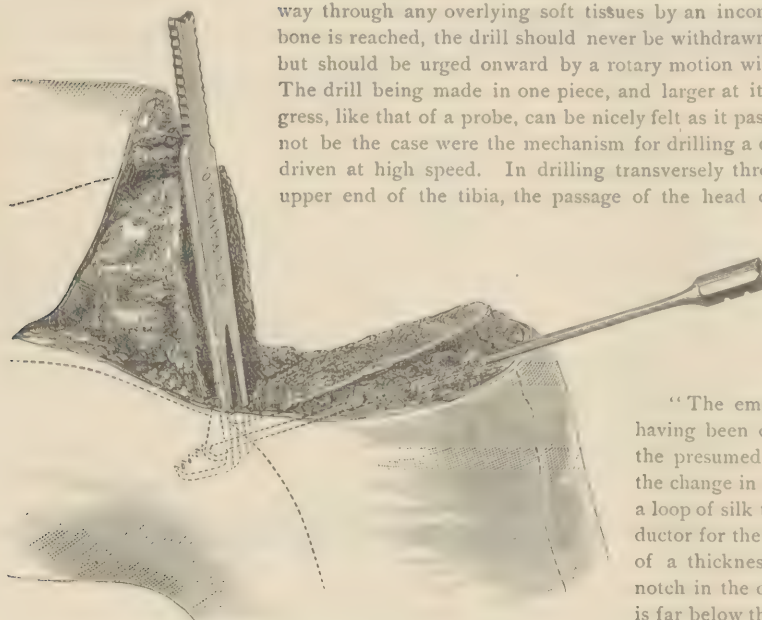
"The procedure is as follows: The bones to be wired are sufficiently bared, but need not be completely denuded. The withdrawal of the soft parts for drilling through the smallest possible incision is effected by means of the grooved

WOUNDS AND INJURIES.

EXCISION OF JOINTS.

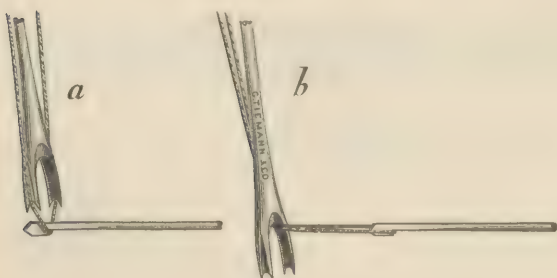
Fluhrer's Procedure of Wiring Bones. (Continued.)

FIG. 4014.
Grooved Retractor in use.



To expose the Notch of the Drill in Wiring after an
Excision of the Knee-joint.

FIG. 4015.



retractor, which not only retracts, but at the same time depresses the obstructing tissues. The drill is passed along the channel of the retractor directly to the bone, cutting its way through any overlying soft tissues by an incomplete rotary motion. When the bone is reached, the drill should never be withdrawn in any degree for fear of fouling, but should be urged onward by a rotary motion with continuous and light pressure. The drill being made in one piece, and larger at its head than in the shank, its progress, like that of a probe, can be nicely felt as it passes through the bone, which would not be the case were the mechanism for drilling a complicated one, or were the drill driven at high speed. In drilling transversely through a bone, as in the case of the upper end of the tibia, the passage of the head of the drill through the proximal portion of compact bone, through the cancellous structure, the striking of the distal portion of compact bone, and its passage through it, can be clearly discriminated.

"The emergence of the point of the drill having been detected by the finger watching at the presumed place of exit, or being known by the change in resistance, the next step is to pass a loop of silk through the bone to serve as a conductor for the wire suture. The silk should be of a thickness barely large enough to fill the notch in the drill. When the end of the drill is far below the surface, the fork is needed to deposit the thread in place. When the soft parts crowd upon the buried end of the drill, they should be pressed back by using the retractor, as shown in Fig. 4014; then the end of the drill is received into the groove of the retractor, and is easily accessible to the fork carrying the loop of thread. When the silk has been lodged in the notch, it is held there by gentle counter-traction, while the drill is cautiously withdrawn without rotation, leaving the thread in its place. When the end of the drill is far below the surface, the counter-traction may be exerted through the medium of the fork. By a dexterous movement the loop may be shifted from the secondary forks (Fig. 4015, *a*) into the crotch of the primary fork (*b*), around which it plays as a pulley as it is drawn through the bone. It is essential

that the closed ends of the loop should lie between the bones to be wired. If, therefore, a loop needs reversing, a second thread is passed through the existing loop, by means of which the new loop is pulled through the bone into position. The free ends of the thread are then passed through the loop and drawn tightly across the face of the bone, as shown in Fig. 4016, thus lining off the broken or sawn surface, and indicating clearly where the drill should be passed through the opposing bone.

"The conducting loops, or guides, for the wire sutures, having been lodged in place, the next step is the drawing of the wires into position. The bent end of the wire suture is hooked into the end of a loop of thread which has been freed, and under a little counter-traction is fed to the opening, while the operator pulls upon the conducting loop and draws one-half the wire through the bone. The end of the remaining half of the wire is then caught into a corresponding loop through the opposing bone, and is drawn into position.

"The bones having been brought into close apposition, each wire is imbedded before being twisted. While the ends are held in their future position, the scalpel is drawn alongside, cutting the subjacent soft parts and letting the

WOUNDS AND INJURIES.

EXCISION OF JOINTS.

Fluhrer's Procedure of Wiring Bones. (Continued.)

FIG. 4016.—The Loops of Thread in Position, preparatory to Inserting the Wire Sutures, after an Excision of the Knee-joint.



wires sink down to the bone. The tightly drawn ends are then twisted and cut short to the twist, which is turned down. The slits in the soft parts are closed over the wire, which is to remain permanently, by a fine catgut suture.

"By proceeding in the manner I have detailed, the wiring together of bones is a precise, easy and expeditious operation. It can be done without extruding the ends of the bones through the soft parts, it being only necessary to cast the guiding loop of thread over the end of the drill, no matter how deeply the latter may be situated. It is easy to carry the wire transversely through the whole extent of bone, thus securing an effective hold upon it. A suture only dipping into the cancellous structure, as is the case in the usual mode of wiring after an excision of the knee-joint, may be regarded as a slack wire. It generally cuts partly through the soft bone tissue before the surgeon can apply retentive apparatus to the limb. On the contrary, when the sutures have been passed completely through the bones in the manner just described, they alone hold the bones firmly in apposition, and the grating formed by the wires prevents the intrusion of the soft parts. In an excision of the knee-joint, in addition to four wires passed antero-posteriorly, I also bind the bones together by a wire passed transversely, which acts as a substitute for the lateral ligaments. In simple fractures of the patella, excisions of the knee-joint and compound fractures, I have passed the drill more than thirty times, besides being present when others have operated in the same manner, and I have never seen a failure or miscarriage in the execution of any step of the procedure."—WILLIAM F. FLUHRER, M. D. November, 1885.

WOUNDS AND INJURIES OF NERVES.

"Nerves, like other tissues, are subject to lesions from physical agencies, which may act without breaking the skin, simple lesions, or may involve the integument; the latter nerve wound is less grave than the former (S. W. MITCHELL).

"*Contusion of nerves* (S. W. MITCHELL) is a common incident of civil practice; as a rule, a blow with any blunt instrument over the length of a nerve is unlike to be serious; but in the same injury to a nerve at its exit from a bony foramen, or where it rests in a furrow of bone or lies superficially on the prominence of a joint, the consequences may be much more severe; a frequent cause of contusion of nerves is the dislocation and reduction of bones, especially at the shoulder joint, where the nerves are liable to be bruised by being pressed between the head of the humerus, the first rib and the clavicle. When violent contusions do not cause immediate symptoms of loss of function, numbness and tingling may succeed the first shock of pain, and only after a time be replaced by grave troubles, due to changes in the bruised nerve. When contusion is followed in a few days by slight numbness and prickling, associated with growing tenderness over the nerve track, prompt treatment is necessary, as there is a commencing neuritis, or a sclerotic state which may or may not be of inflammatory origin; the nerve may sometimes be felt in thin persons as a firm cord; in some cases the evil is most insidious, and may result in large functional losses without any notable pain or tenderness. The proper treatment for a contused nerve is absolute rest, with the use of leeches and cold water when symptoms of neuritis are present; apply three or four leeches twice weekly along the nerve, and cold continuously, unless disagreeable to the patient; inject morphia if the pain is severe; later, opium plaster along the nerve is useful, and, if pain is intermittent, give quinine or arsenic.

"*Compression of nerves* (S. W. MITCHELL) by external and internal causes is frequent, as by cicatrices, callus, tumors, parturition, faecal accumulations, malposition during sleep, use of a crutch; the effect of pressure upon a nerve is to disturb the contents of the nerve tubes in such manner that impressions are no longer conveyed until the pressure is removed and the continuity of the contents of the nerve tube is restored. The symptoms are: 1. Delusive impres-

WOUNDS AND INJURIES

OF AND OPERATIONS ON NERVES.

Suture, Neurotomy, Neurectomy, Stretching.

sions, as formication, pricking, sense of warmth; 2. A seeming return to the normal condition and feelings; 3. Hyperæsthesia, all the functions exalted, muscular power unchanged; 4. Anæsthesia and muscular palsy, preceded by a sense of roughness of the skin, burning, muscular weariness, vague cramps. When the pressure is removed, recovery takes place in a reverse order: 1. There is first pain, tickling, sensibility; 2. Sudden sense of cold and feeling of enormous weight; 3. Awkward motions, with formication; 4. Regular motions and sense of heat. The treatment consists in removing the cause, and meeting the inflammatory symptoms with the remedies directed in cases of contusion.

"*Wounds of nerves* (S. W. MITCHELL) may be incised or punctured. The incised wound is caused by severe cuts, as with a knife, or glass. It is of great importance to make out first the extent of injury, and this may be done by examining as to the local paralysis. If the nerve is partially divided, cleanse the wound of all foreign matter with carbolic solutions; close it with sutures or adhesive strip; place the limb in a position to relax the tissues and approximate the cut ends: enjoin perfect rest; apply cold. Where it is plain that the nerve trunk has been altogether divided, the silver wire suture may be used to approximate the extremities; it should be inserted near the cut surfaces, or through the loose tissue related to its sheath; the wound should then be accurately closed; the restoration of function takes place only after long periods. Punctured wounds of small branches are more serious than of large trunks; they follow the use of the lancet, as in venesection and vaccination, or other penetrating instruments. The symptoms are: Acute pain in the track of the nerve, immediately or very soon, gradually increasing in severity until spasms or convulsions occur; slight injuries of the digital nerves seem especially prone to occasion distressing symptoms and wide-spread reflex sympathies. The treatment is complete division if practicable; rest and cold to prevent inflammation; hypodermic injections of morphia to relieve pain."—"Operative Surgery." Stephen Smith. 1887.

"*The suture of nerves* favors cicatrization and regeneration of the peripheral ends; it has proved a harmless operation and is indicated in all cases of sections of nerves where the ends cannot be easily maintained in contact by position. The elastic bandage may be used. The search for the two ends of the cut nerve is very successful, as these structures have little contractility; if the wound is deep, enlarge it by an incision parallel with the nerve, in order to spare manipulation of the wound, which prevents immediate union and facilitates the passing of the threads. If the nerve prove to be clean cut and recent, proceed to pass the thread; but, if crushed or cicatrized, resect a portion and then suture. The needle should be fine, and the thread prepared catgut. If the nerve ends can be brought and kept in perfect apposition by a suture involving only the sheath, do not penetrate the nerve tissue, but otherwise pass the needle through one end of the nerve to the under side and back through the other, and tie the thread; cut off both ends closely and close the wound accurately with continuous suture and apply gentle compression. If the wound is deep, a drainage tube may be required. The nerve ends must be exactly adjusted. Union takes place in about two weeks. Suppuration must be prevented by antiseptics. If it is impossible to find the corresponding end of the nerve, and another nerve is found, two different nerves may be united.

"*Neurotomy*, the section of a nerve, is justifiable only as a last resort, all other measures having failed (S. W. MITCHELL). It should always be made at a point which will involve as few terminal branches as possible, and yet the division must be sufficiently high to include all of the affected trunk; for, if diseased tissue is left above the line of division, the subacute neuritis and sclerosis may continue to ascend the nerve and render the operation useless; it is important that the area of the painful region should be accurately determined and the trunk carefully examined for enlargements and hardness by rolling the nerve under the finger; as a rule, the section should be a short distance above the point at which the nerve ceases to feel enlarged and hard; if it is practicable to find a spot, even a little farther up the limb, where the nerve is neither swollen nor tender, select that point; when the nerve lies too deep for examination, especially if the neuralgia is of long standing and of traumatic origin, operate as near the body as possible (VON NUSSBAUM). But neurotomy, or simple division of a nerve, is at present scarcely ever practiced, owing to the certainty of prompt reunion.

"*Neurectomy*, the resection of a nerve, is to be preferred to neurotomy, and not less than two inches of its length ought to be removed, the object being to make reunion impossible, or very remote in point of time; in addition it is well to turn the peripheral extremity back, and, if necessary, secure it with a loop of wire, or even interpose muscle or fascia to prevent the possibility of union (S. W. MITCHELL, W. A. HAMMOND, E. BROWN-SEQUARD).

"*Stretching* of spinal nerves, as a final resort for the relief of spasms (T. BILLROTH), is now recognized as a justifiable operation; it has been employed also in locomotor ataxia. It originated in the exposure, isolation and rubbing of the sciatic nerve from a point below the gluteal fold, through the sciatic foramen, to the sacral foramen, for the purpose of relieving epilepsy supposed to be due to some irritating cause affecting the nerve. No such cause was found, but the stretching which the nerve received relieved the spasms. It is believed that the manipulation produces a favorable change in the position of the nerve fibres in the trunk, whereby their nutrition is improved. The procedure is essentially the same as that of dissecting a similarly affected nerve out of cicatricial tissue (J. M. WARREN), long since successfully practiced. The operation consists in exposing the nerve and stretching it with fingers, forceps or blunt hooks, as if attempting to draw it from its connection to the spinal cord."—"Operative Surgery." Stephen Smith. 1887.

WOUNDS AND INJURIES.

EMERGENCY OPERATING SETS.

Heuel's Pocket Case.

FIG. 4017.—Heuel's Pocket Case.

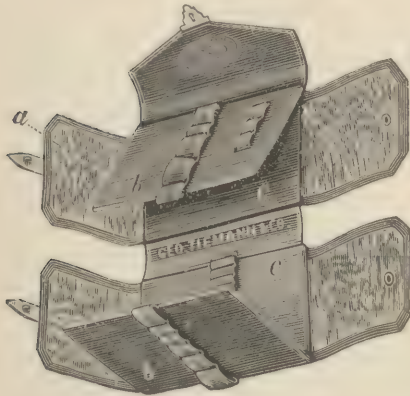


FIG. 4018.
Four-bladed Pocket Instrument.

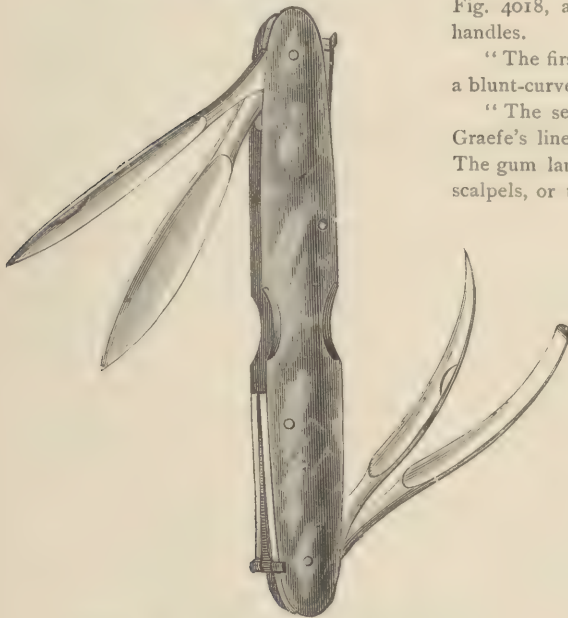
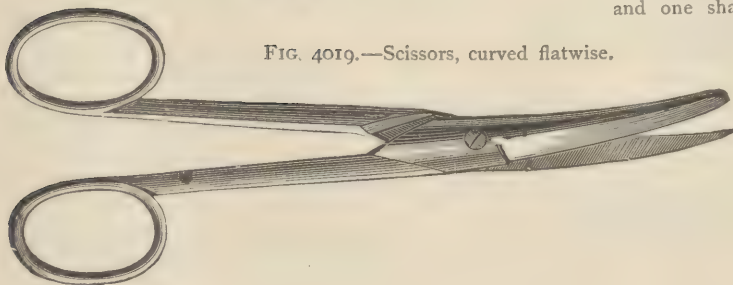


FIG. 4019.—Scissors, curved flatwise.



"My idea of a surgeon's pocket case is that it should be made of the best materials, contain the best instruments, and those of the most approved design, be a minor operating case, and, in emergencies, be suitable for even the larger operations, at the same time not too large to be conveniently portable.

"My case, which I usually carry in a chamois-lined hip-pocket, is five inches and a half long by three inches and a quarter wide, and one inch in thickness. It is made of alligator, sealskin or morocco leather, the latter being thinnest, while it is also very durable. It is lined with the best silk velvet, is four-folding, with retaining flaps (see *a* in accompanying figure), and has no pockets, these being liable to tear. In opening, it appears like a two-fold case, having the thicker instruments as close together as possible, though not crowded on one another. Each flap (*b, b*) may then be opened, revealing (*c, c*) on one side the thinner instruments—such as probes, blunt dissectors, &c.—and on the other the needles, pins, &c., neatly arranged in rows upon the flap, together with a variety of plaited and black iron-dyed silk, horsehair and catgut sutures, ligatures, thin isinglass plasters, &c.

"The instruments consist of, firstly:

"*Knives*.—These are two in number, and, like the one shown in Fig. 4018, are four-bladed, having spring catches and tortoise-shell handles.

"The first contains a large and a medium-sized scalpel on one side, a blunt-curved bistoury and Syme's abscess knife on the other.

"The second contains a small tenotome and small bistoury, a Graefe's linear cataract knife, and a half-curved canalicula knife. The gum lancet has been omitted from the case, since either of the scalpels, or the tenotome, will meet all of its requirements. The various sized scalpels will answer for amputations, even up to the shoulder joint, removal of tumors, &c. Syme's abscess knife I prefer to the common, thick-backed, curved bistoury, as it is double-edged, and hence gives less pain in its introduction. Graefe's linear knife is very useful for amputating the fingers in children, while the half-curved canalicula knife is well adapted for opening stytes, and for other delicate work.

"Secondly, *Scissors*, Fig. 4019.—These have closed rings, which are preferable to those with open handles, as they are much steadier in the fingers. They are slightly curved on the flat, thus answering the purpose of both curved and straight scissors, which is a great desideratum in some cases, having one dull point for removing dressings without injuring the skin, and one sharp point to easily and painlessly cut sutures. They may also have a French joint to admit of more thorough cleaning.

"Thirdly, *Forceps*.—These are six in number, five of which can be used for controlling hæmorrhage in case of necessity:

"Fig. 4020 is useful as a fixation, torsion, dressing and dissecting forceps; it has an Esmarch's slide-

WOUNDS AND INJURIES.

EMERGENCY OPERATING SETS.

Heuel's Pocket Case. (Continued.)

FIG. 4020.—Esmarch's Artery Forceps.



FIG. 4021.—Andrew's Artery Forceps.



FIG. 4022.—Forcepressure Forceps.

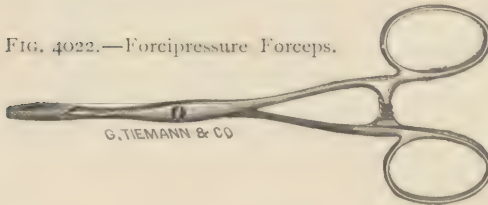


FIG. 4023.—Piffard's Grappling Forceps.



FIG. 4024.—Heuel's Needle Forceps.

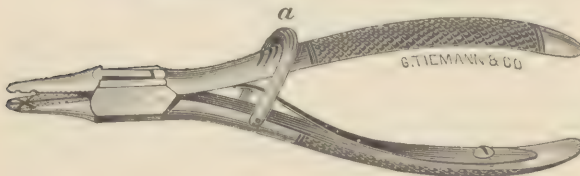


FIG. 4025.—Heuel's Bone Forceps.

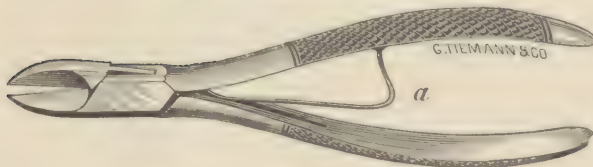


FIG. 4026.—Hypodermic Syringe.



catch, which is removable, so that the forceps may be thoroughly cleaned.

"Fig. 4021 is an Andrew's artery forceps with Esmarch's slide.

"Fig. 4022 is a compound polypus, dressing and artery forceps, with ring handles, ratchet clamp, French joint, and longer jaws than those shown in cut.

"Fig. 4023 is a Piffard's grappling forceps with Esmarch's slide-catch. This I have found a very useful instrument in removing tumors, cysts, bullets and foreign bodies.

"Fig. 4024 is a needle forceps of my own design, with duck-bill jaws and a Russian catch, *a*. It will hold with equal firmness a fine needle or a coarse instrument, giving a secure hold for the hand, and is very useful in removing splinters, needles, toe-nails, &c.

"Fig. 4025 is a small-sized, strong bone-cutting forceps, made after Liston's pattern, and having a reversible spring, *a*. The cut shows the instrument ready for use; when in the case, the spring *a* is reversed to prevent spreading of the handles. It is very useful in operating about small bones like those of the hand, for cutting pins, wire, &c., and can be employed in a very small space.

"Miscellaneous instruments:

"A *thermometer*—self-registering, well-seasoned and placed in a thin coin-silver case, having cotton in both ends to avoid breakage.

"An *hypodermic syringe* (Fig. 4026) with a graduated glass barrel, a fenestrated metal guard, and graduated piston-rod with screw adjustment, *b*.

"Nested in the piston-rod are one coarse and one fine needle, confined by a screw-cap, *a*. The projection, *c*, beneath the shoulder of the screw-cap, *a*, is ground to fit tightly the top of syringe barrel when the piston is down. This, with the additional screw-cap, *d*, at the bottom, hermetically seals the barrel, thereby keeping the piston moist and in good working order for a long time, which is more than can be said of the majority of syringes, whose pistons easily become dry and utterly useless if not frequently used. In case of necessity the syringe may be used as an aspirator, but great care must be exercised to thoroughly cleanse it before again using it for hypodermic injection.

"A small loop is left in the pocket-case for hypodermic tablets in the original bottle, to take the place of the bottle of morphine solution or powders, which are usually carried.

WOUNDS AND INJURIES.

EMERGENCY OPERATING SETS.

Heuel's Pocket Case. (Continued.)

FIG. 4027.

Tiemann & Co.'s Sterling Silver Male and Female Catheter.

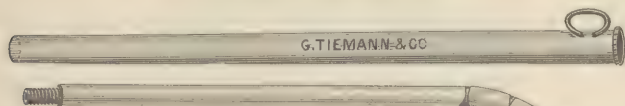


FIG. 4028.—Weir's Vaccinating Lancet.

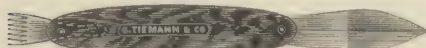
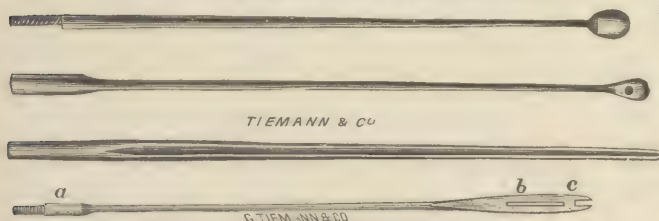


FIG. 4029.—Aluminum Caustic Holder.



FIG. 4030.—Heuel's Probes and Directors.



by other pieces, makes an excellent searcher for exploring the bladder in children.

"One very flexible whalebone probe for tortuous sinuses.

"One Arnott's grooved probe to act as a fine director in narrow sinuses, and, in case of necessity, for external perineal urethrotomy.

"One combined porte-mèche, *c*, and seton-carrier, *b*.

"One flexible steel, extra-small Nélaton's porcelain-point (one-sixteenth of inch in diameter) bullet probe, especially useful in locating leaden fragments.

"An aneurysm needle with a large eye. A tenaculum. A volsella, or double hook, each fitting into the caustic holder for a firm handle.

FIG. 4031.—Spatula and Tongue-Tie.



FIG. 4032.—Heuel's Scoop and Spade.



FIG. 4033.—Heuel's Bone Scoop and Levator.



"A Tiemann & Co.'s new sterling-silver male and female catheter (Fig. 4027), with a flexible jointed end, made in two sections, one nesting within the other, thus economizing space and saving the catheter from damage by pressure of other instruments.

"A Weir's vaccinating lancet and comb (Fig. 4028).

"An aluminum caustic holder (Fig. 4029), which is non-corrodible by nitrate of silver, and which is fitted with an extra male thread to screw into the end of the catheter, if a longer caustic holder is desired. Within the extra male thread is a female thread, into which the probes, tenaculum, aneurysm needle and double hook in the case can be screwed if a firm handle to either is needed.

"On turning over the left-hand flap, *b*, of pocket-case, it discloses loops for the thinner instruments:

"Probes (Fig. 4030), of which there are six varieties, each five inches in length and fitting a middle joint, with a female screw at each end, to make the probes fifteen inches long when desired to explore long sinuses, viz.:

"Two sterling-silver probes, one with a large, the other with a small point. The large point, suitably bent and lengthened

"A combined tongue-tie (Fig. 4031) instrument and strong spatula, which will act as a large blunt dissector or tongue depressor.

"A combined, strong, spade-shaped dissector, *b*, and sharp medium scoop, *a* (Fig. 4032).

"A combined, strong, square, blunt dissector, *b* (useful in raising periosteum), and sharp, fenestrated bone scoop, *a* (Fig. 4033).

WOUNDS AND INJURIES.

EMERGENCY OPERATING SETS.

Heuel's Pocket Case. (Continued.)

FIG. 4034.—Gross' Ear Spoon and Hook.

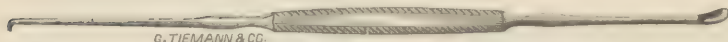
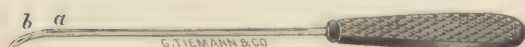


FIG. 4035.—Aspirating Needle.



FIG. 4036.—Heuel's Pin Conductor.

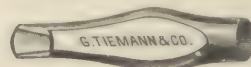


"A Gross' ear spoon and hook (Fig. 4034).

"A combined, large, grooved director and large, dull scoop.

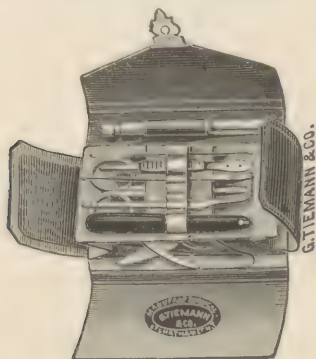
"A large aspirating needle (Fig. 4035), five inches long, for exploring deep tumors, tapping hydrocele, &c. It has a female thread inside the shoulder, *b*, for screwing on to the hypodermic syringe if suction is required. The shoulder at *b* is for attaching rubber tubing if desired.

FIG. 4037.—Heuel's Punch.



"A combined Post's and Buck's pin conductor (Fig 4036), for readily introducing pins in hare-lip suture. The groove of the needle at *a*, *b*, is bridged over, forming a canal, which is closed at *a*.

"A fenestrated punch (Fig. 4037), fitting into the needle holder for a firm handle for carrying out Neuber's wound draining without drainage tube (see article by Dr. A. G. Gerster, *N. Y. Medical Journal*, vol. xxxix., No. 10)." — By Franz Heuel, Jr., M. D., in *Medical Record*, August 9th, 1884.

FIG. 4038.
Dr. Stephen Smith's Compact Aseptic Pocket Case.

2 Tiemann & Co.'s Patent (B) Catch Hard Rubber Handles, for following blades:

- | | |
|---------------------------------|-----------------------|
| 1 Scalpel. | 1 Sharp Bistoury. |
| 1 Probe Bistoury. | 1 Tenotome. |
| 1 Gum Lancet. | 1 Scissors. |
| 1 Director and Aneurism Needle. | 1 pair Silver Probes. |
| 1 Artery Forceps. | |

Needles and Silk.

Vial for Iodoform.

Vial for Bi-chloride of Mercury (Fig. 4044).

1 Morocco Case, 3 $\frac{1}{4}$ inches long, 2 inches wide.

FIG. 4039.—Tiemann & Co.'s Patent Catch Handle
(furnished for Stephen Smith's Pocket Cases).

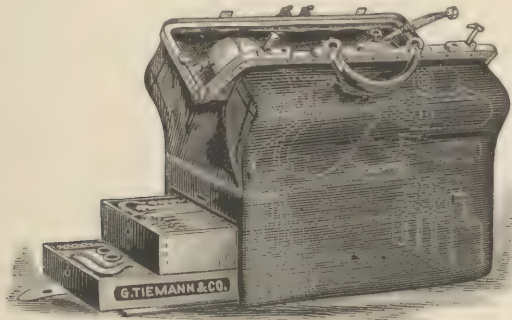
Directions.—To secure the blades firmly in the handle, slide the shank of the blade into the slot at the distal end of the handle, turn down the eccentric bolt to a right angle on either side, and the blade is held firmly in position. By turning the bolt up, the blade is as easily removed. Either side of the blades fits and can be adapted so easily without even looking on. These instruments are cleaned readily, and there is no danger from poisonous matters.

WOUNDS AND INJURIES.

EMERGENCY OPERATING SETS.

Stephen Smith's Antiseptic Surgery Case.

FIG. 4040.—Dr. Stephen Smith's General Antiseptic Operating Case.



"The general operating case for antiseptic surgery is a very strong leather valise, fourteen inches long, ten and one-half inches high and seven inches wide. It has two drawers to slide out at one end; these two drawers have double trays, each containing all the instruments enumerated below. When these drawers are inclosed in the bag, a flap below covers up the front tight and this is locked inside by the strap passing through the aperture in the case. In the bottom of the rear part of the case is a partitioned space for four bottles, well secured. The upper part of the valise and the drawers are entirely separated by a partition. This upper portion contains the various articles for antiseptic dressings, as given in the list below:

TOP DRAWER AND TOP TRAY.

- 3 Steel Handle Tenacula.
- 3 Assorted Scalpels.
- 1 Blunt Tenotome. 1 Probe Tenotome.
- 1 Sharp Tenotome. 1 Hernia Bistoury.
- 1 Levis' Hernia Director.
- 1 Large Scalpel (extra size).
- 1 Metacarpel Knife $4\frac{1}{2}$ inch.
- 1 Straight Blunt-pointed Scissors.
- 1 Strabismus Forceps.
- 1 Dissecting Forceps.
- 1 Andrew's Artery Forceps.
- 1 Hamilton's Sequesterum and Needle Forceps, with catch.
- 1 Metacarpel Saw.
- 1 Bow-saw, with extra fine blade.
- 1 Flexible Bullet Probe.
- 1 Steel Probe, hard rubber covered.
- 1 White's Long Fistula in ano Probe.
- 3 Serrefines. 1 Long Probe.
- 2 Short Probes. Needles, assorted.
- Antiseptic Ligature, on reels.
- Plastic Pins.
- 2 coils of Silver Wire.
- 8 Langenbeck's Hæmostatic Clamp Forceps.

BOTTOM TRAY.

- 1 Long Bone Forceps, with spring.
- 1 Large Chisel.
- 1 Medium Chisel.
- 1 Stephen Smith's (bone-splitting chisel), Osteotome.
- 1 Plain Hollow Gouge.
- 1 Stephen Smith's Bone Knife and Rasp.
- 1 Hollow Gouging Spoon, for bones.
- 1 Carbonized Bone Gouging Forceps.
- 1 pair Double Retractors.
- 1 Trocar and Canula.
- 1 Trepanning and Toe-nail Extracting Forceps.
- 1 Galt's Trepine and Handle.
- 1 Brush.
- 1 Handle with 3 Bone Drills.
- 1 Antrum Cutting Hook.
- 1 Burr Drill.
- 1 Aneurism Needle.

BOTTOM DRAWER, TOP TRAY.

- 1 Liston's Amputating Knife.
- 1 Tonsil Scissors.
- 1 Tiemann & Co.'s Bullet Forceps.
- 1 Thumb Vulsellum Forceps.
- 3 Wyeth's Hæmostatic Forceps.
- 1 Curved Urethral Forceps, alligator.
- 1 Roux's Needle Forceps.
- 1 Hypodermic Syringe, extra large, with Aspiratory and Exploring Points

BOTTOM TRAY.

- 1 Uterine Curette.
- 1 Sponge Holder.
- 1 Simpson's Sound.
- 1 Gouley's Lithotomy Staff.
- 1 Small Lithotomy Forceps.
- 2 Gouley's Catheters for External Urethrotomy
- 1 Silver Double Trachea Tube.
- 1 Bozeman's Speculum Vaginæ, articulated handle and 2 blades.
- 4 Filiform Guides.

TOP PART OF VALISE.

- 4 Bottles. 1 Gerster's Iodoform Box.
- 1 Bristle Probang. 1 Fitch's Handy Aspirator.
- 1 Knapp's Ether Inhaler. 2 Aspirator Points.
- 1 Esmarch's Tourniquet.
- 1 No. 2 Syphon Syringe with Sprinkler, for washing.
- Borate of Cotton.
- Antiseptic Gauze.
- Bichloride of Mercury.
- Catgut Ligature. Sponge.
- Rubber Drainage Tubing.
- Stomach Tube for Washing out Stomach.
- 1 Velved-eyed Male Catheter.
- 1 Female Catheter, &c.

WOUNDS AND INJURIES.

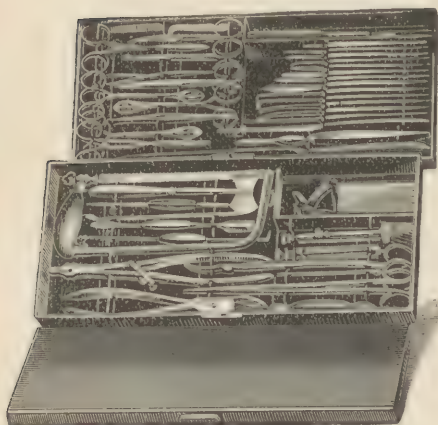
EMERGENCY OPERATING SETS.

Tremaine's Antiseptic Surgery Case.

FIG. 4041.—Tremaine's Operating Bag.



FIG. 4042.—Tray.



accompanying cut. The instruments are contained in a box made of spring brass, nickel-plated or gilt, and fitted with metal racks. The box contains the following instruments, some of which are new in pattern :

- | | |
|----------------------------|---|
| 1 Amputating Knife. | 2 Tremaine's Hare-lip Clamps |
| 1 Sands' Periosteum Knife. | 1 Tremaine's Ratchet Trephine. |
| 1 Metacarpal Saw. | 1 Small Aspirator. |
| 1 Finger Knife. | 1 Sequestrum Forceps. |
| 1 Cooper's Hernia Knife. | 1 Bone Forceps. |
| 1 Probe-pointed Bistoury. | 1 Needle Forceps. |
| 1 Aneurism Needle. | 1 pair Tremaine's Retractors. |
| 1 Tenaculum. | 1 Tremaine's Saw (2 blades). |
| 1 Large Scalpel. | 1 Elevator. |
| 3 Smaller Scalpels. | 1 Tracheotomy Tube. |
| 1 Curved Bistoury. | 1 Director. |
| 1 Sharp-pointed Tenotome. | 3 Silk or Catgut Spool Cases, (Tremaine's). |
| 1 Blunt Tenotome. | 1 Needle Case. |
| 1 Eye Spud. | 1 Long Uterine Scissors. |
| 6 Hæmostatic Forceps. | 2 Probes. |
| 1 Bull-dog Forceps. | |
| 1 Olds' Scissors Forceps. | |

FIG. 4043.—Top view of Satchel, showing bottles.

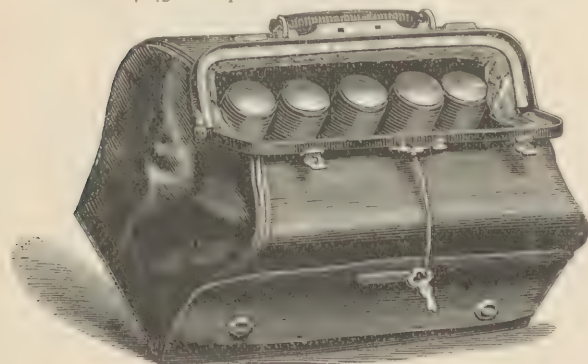
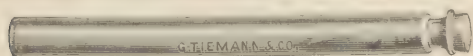


FIG. 4044.—Vial for Iodoform or Chloride of Mercury.



"For some time it has seemed to me desirable that surgeons, who are liable to be suddenly called by day or night, should have an operating case, in convenient and portable form, supplied with all the instruments likely to be used in any operation of emergency, such as amputation, kelotomy, tracheotomy, &c.; and, moreover, in these days of antiseptic surgery, that the case in which the instruments are kept should have no absorbent material to become contaminated.

"An ordinary travelling satchel can be fitted to contain the instrument case. The sample case, which was made by Messrs. George Tiemann & Co., of New York, is shown in the

"The spool cases of hard rubber will especially commend themselves, as also the hare-lip clamps.

"The interior of the bag is fitted with metal-cased bottles, to contain chloroform, antiseptic solutions, catgut ligature, &c., at the pleasure and preference of the surgeon. It also gives plenty of room for additional non-cutting instruments, with a package of antiseptic gauze, sponges, Esmarch's bandage, &c.

"After many years of experience of the needs of the surgeon in military, civil and railroad practice, I believe this case will fill every need of the operating surgeon in any emergency. As such I present it to the profession. Of course the instruments can be varied to suit the needs of the surgeon."—Dr. W. S. Tremaine, M. D., Surgeon U. S. Army, in *New York Medical Journal*, July 17, 1886.

RESTRAINTS.

CARE OF THE INSANE.

Most Humane and Approved Forms of Restraints.

Our muff is of a new design, much superior to all the older styles, and made of heavy russet leather. It is pressed into shape and stitched afterward, so that it always retains its form. Permanent wristlets are attached and so fitted with buckle as to be adjustable to any size of wrist. These wristlets are turned on the edge and lined with best buckskin, as are also the seams in the muff. The most thorough ventilation is secured by perforation on the under surface and back.

FIG. 4045.
Restraint Buckle. Shoe and Clothing Buckle.



FIG. 4046.—Lynch's Muff.

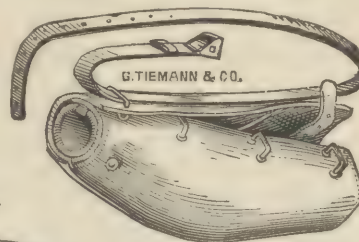


FIG. 4047.—Mitts.

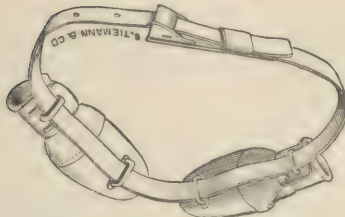


FIG. 4048.—Wristlets.

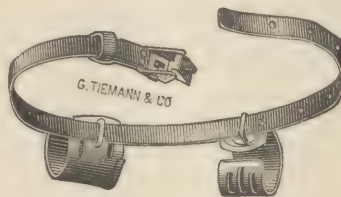
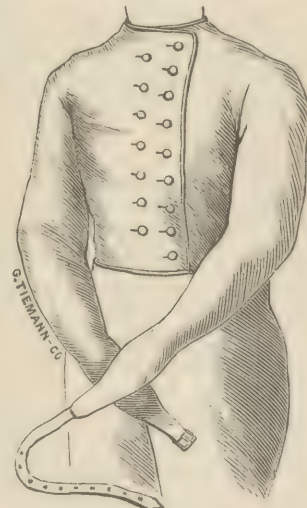


FIG. 4049.—Straight Jacket.



The wristlet and upper part of palm (Fig. 4048) are made of heavy russet leather, and lined with best buckskin. The front and back of hand are of calf russet, soft and pliable. Ventilation by perforation in the back. Attachment to waist strap by two brass staples on each wrist, as shown in cut.

These are made of the best heavy russet stock, pressed into shape and afterwards lined with the best buckskin. This secures permanency of form and avoids wrinkling of lining. A roll is turned on the side next the hand. The wristlet is attached to the waist strap by a brass staple and plate, and is adjustable for three sizes of wrists.

FIG. 4050.—Anklelets, with small buckle.

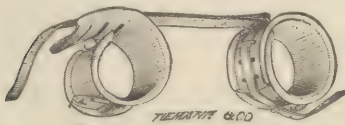


FIG. 4051.
Buckles and Key.

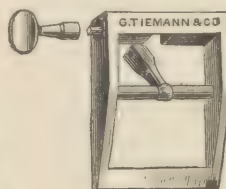


FIG. 4052.—Anklelets, with large buckle.



FIG. 4053.—Shoe Buckles, with Straps and Loops.



Those with small buckles (Fig. 4050) do not become separated when detached from the patient, but are always together when required for use. They are adjustable to any ankle and are especially designed for daily use.

Those with large buckle (Fig. 4052) may be used separate, and are best adapted for night use. Both are made of No. 1 russet leather, lined with best buckskin, and rolls are turned on both edges.

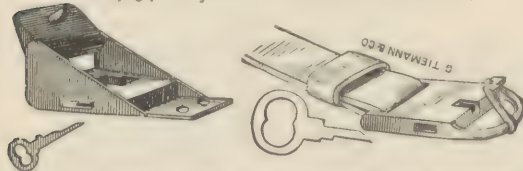
Fig. 4053 shows a very neat small buckle, a modification of the larger, for fastening shoes and clothing. It is nickel-plated; can be readily attached; locks and unlocks on the same principle as the larger buckle.

RESTRAINTS.

CARE OF THE INSANE.

Most Humane and Approved Forms of Restraints. (Continued.)

FIG. 4054.—Lynch's Patent Lock Buckles.



Directions for use of Lynch's Buckle.—To unlock, push in the key straight; to lock, press down small pin in end of bolt with the forefinger of the right hand, then shove in the bolt with thumb of same. The pin is to prevent locking till ready. When not in use slip in the bolt.

Suggestions to Sheriffs, Police Officers, and others having the Insane in charge before Commitment.

"The following suggestions are offered for the benefit of officers called upon to deal with insane patients.

"1. An insane person is a sick person, and as such should receive every attention and care in the power of the officer.
 "2. People do not change their natures by becoming insane. Whenever possible, they should be treated as reasonable beings. Their feelings and rights should be regarded. No one should be allowed to make them an object of ridicule or banter.

"3. Harshness is never necessary, and physical force, only occasionally.

"*The use of steel hand-cuffs, leg-irons, chains and ropes is unnecessary severity.* In those exceptional cases where it is necessary to restrain patients, much suffering will be saved if each sheriff will procure and keep at hand a few simple articles of apparatus. The following will suffice: *a sole leather muff*, to be used in cases where the patient tears off the clothing; *a belt with wristlets*, to prevent persons from striking, the belt being fastened by lock buckles, and the wristlets so arranged as to slide freely on the belt; *one or two camisoles*, which consist of a jacket buttoning behind, made of duck or stout denims, with sleeves extending beyond the hands ten or twelve inches. The sleeves can be crossed and secured behind the back. The camisole prevents violent demonstrations and is especially adapted to female patients. In the more populous counties it might be desirable to obtain *leather anklets* which prevent kicking.

"4. Do not be afraid of insane patients; usually they are harmless, and, when otherwise, the use of the apparatus suggested is a sufficient protection. Gentleness and tact will often render the use of apparatus unnecessary.

"5. It is the general practice to confine insane patients in jail, pending examination. This practice is without express warrant of law, but is doubtless sometimes necessary to keep the patient safely. There can be no excuse, however, for treating an insane patient as a criminal, still less for locking him up in the same apartments with other prisoners, as is often done. In many cases, especially where the patient is suffering from an acute attack, the jail is not a proper place for him, but he should be kept in a suitable room in charge of a competent person.

"6. *Medical Advice.*—In all cases of great excitement or prostration, a physician should be called at once. In some cases a sedative or a hypodermic injection is needed to give opportunity for the excitement to pass away; in other cases medical advice is needed as to food and treatment.

"7. *Deception.*—Do not tell untruths to insane people; it is cowardly and very injurious. When a patient is to be taken to the hospital, do not tell him that he is to be taken to a hotel or a summer resort, or on a visit. Explain quietly and pleasantly, but firmly, that he is to be taken to the hospital for treatment, in order that he may be freed from his troubles of mind.

"8. Special care is necessary in moving insane patients, particularly in entering or leaving buildings, vehicles and cars. Patients often suffer serious bodily injury in these transfers, which might be prevented by care and tact. Explain beforehand what you are about to do; a little deliberation and patience will often obviate the necessity for force. When force is used it should be gently applied, but sufficient to overcome resistance easily.

"9. *Treatment of Women.*—The greatest care and delicacy should be observed in dealing with female patients. No indignity should be offered, nor any violation of their sense of propriety. In some States there is a provision of law that female patients shall always be accompanied by a woman *en route*. This should always be the case, but our great distances sometimes render it impracticable. Insane women travelling under the care of a male officer sometimes suffer great hardships. Women from the country are often unaccustomed to the use of water-closets and other conveniences in hotels and railway cars. It is not uncommon for women to be brought to a hospital in a filthy condition and under great mental excitement, simply because they have not received proper attention.

"10. When you visit the hospital ask to be shown how they deal with new-comers.

"11. If at all practicable, avoid reaching the hospital in the night. The new patient receives a gloomy and depressing first impression of the institution, amounting in some cases to positive horror, which it is sometimes impossible to counteract. Officers and attendants must be roused, and scores of patients are sometimes awakened and disturbed by the arrival of an excited patient."—Issued by the Superintendents of the Minnesota Insane Hospitals and the Minnesota Board of Corrections and Charities.

ORTHOPÆDIC.

CORRECTION OF BODILY DEFORMITIES.

Orthopædic Surgery.

"*Orthopædics, or orthopædic surgery*, is that branch of practical surgery which deals with the correction of bodily deformities, from whatever cause arising (REEVES). Improving the patients' condition and advancing the science of this branch of surgical work—the common motive of all conscientious practitioners, however they may differ in the selection of their means (AXIOM). Pretenders and quacks publish accounts of their wonderful cures and the miracles they have performed in the secular press, or in other than scientific and professional journals, never laying down any laws or rules to aid another in performing the same cure in similar cases. And this constitutes one of the essential differences between an honorable physician and a quack: the one labors to disseminate and diffuse his knowledge for the benefit of his whole profession, in order that he may relieve as much of human suffering as is within his power; the other endeavors to conceal the little knowledge he may possess for his own particular profit or gain (SAYRE)."

"Outside of large cities, the majority of patients needing attention on account of deformities, or diseases or accidents that lead to them, must find relief at the hands of the profession in their near vicinity, or not find it at all. The proportion of the wealthy, who can be sent a considerable distance to *specialists*, is so small in relation to the whole as to make very little diminution of the number that must be treated at home. This renders it important that there should be a general prevalence, in the profession, of a knowledge of prevention and treatment; to bring the means of relief within the pecuniary resources of the majority of sufferers. In order to render the advance in knowledge on this subject, gained within the last twenty years, accessible to the mass of the profession, it is necessary that the substance of many valuable essays and monographs should be sifted and collected into a few pages, within the means of all to procure and within the time of all to read."—"Orthopædics." David Prince.

General Remarks on Orthopædic Therapeutics.

"The principles, few and very intelligible, are these: 1. To remove, if possible, the cause of the deformity. 2. Correction of the deformity through changing the position of the distorted bones, or through extension of contracted muscles and ligaments, or by division and subsequent extension of retracted muscles and their tendons. 3. To maintain the improved position and prevent relapse.

"Under the first head come all these precautions as to correcting bad habits of position in early life, and, afterwards, in occupations. Miner's lateral curvature and baker's flat foot are instances of deformity produced by improper vocational positions, and by long standing and carrying heavy weights. In the limbs fractures should be so set, and diseased joints proceeding to ankylosis so regulated, as to obviate deformity as much as possible, and to allow the limb to become fixed in a serviceable position.

"The details of the second head may be summed up by saying that they consist in: *a.* Bodily movements, active and passive; *b.* Improvement of the general health; *c.* Mechanical means, and by operative methods.

"Under the third head are included the supervision of the case, the continuance of local and general measures used in the correction of the deformity, and the regular and judicious exercise, in its normal functions, of the part which has been restored to, or near to, its proper shape."—"Practical Orthopædics." Reeves.

"*Manipulation* may be regarded as the natural remedial agent for the care of a deformity. There can be no substitute for manipulation by the human hand. There is an intelligent touch that admonishes you of the amount of resistance present, the amount of force required to overcome it, and when you should stop its exercise. You are able by this means to determine whether you are producing spasmodic contractions and consequent irritation, and can arrest your force at any desired point. This is what is generally understood by the term *massage*, from the word *μάσσω*, to knead; the great value of which has not been understood or used by the profession as much as it deserves. All such movements are exceedingly beneficial, and very much increase nutrition by stimulating an increased blood supply to the parts; the friction and kneading stimulate the absorbents in the removal of abnormal deposits. In cases of paralyzed muscles, massage is frequently combined with *whipping or beating of the muscles* by the india rubber muscle-beater of Klemm, or sometimes by an india rubber hammer in the form of a thimble fastened to an elastic handle, with which rapid percussions can be given to the deepest muscles, thus increasing the circulation in these parts and tending to an increase of development. *The occasional application of electricity* may also be of service.

"*Gymnastics*.—These are of great service in the treatment of deformities, but they must be used with great caution and under wise supervision.

"*Mechanical Appliances*.—These are necessary for the purpose of retaining deformed parts in certain positions after they have been placed in such positions by manual force; but the more frequently these mechanical appliances are removed, and the part subjected to manipulation, the greater will be the success that will attend treatment. While using any mechanical apparatus, if manipulation be neglected, the patient will be deprived of that stimulus, motion, which is so essential for the perfect preservation of the usefulness of the deformed parts. The principal requisites of an orthopædic apparatus are: simplicity, facility of application and lightness, as far as compatible with the object to be accomplished by its use. It should never encircle the limb or trunk in such a manner as to interfere with the

ORTHOPÆDIC.

CORRECTION OF BODILY DEFORMITIES.

General Remarks on Orthopædic Therapeutics. (Continued.)

circulation, nerve-currents or natural movements of the parts. It should act in its tractile force gradually and constantly, and, as the line of deformity is slowly changing its direction; it becomes very necessary that the apparatus be frequently removed and reapplied or adapted to the new line of distortion. The persons in charge of and using the apparatus, should thoroughly understand their manner of action, be perfectly acquainted with their mechanism and the object to be gained by their application. At the outset the practitioner should adapt the instrument to the deformity, and not the deformity to the instrument, as is too frequently attempted. Proceed in a gentle manner until the first difficulty is overcome. The pain experienced in the part soon wears off as the mind becomes more tranquil, and then you can, day by day, bring to bear upon it such force as will tend to secure the desired object. In the choice of a mechanical apparatus you should be guided, not only by its adaptability to the member to which it is to be applied, but also by your acquaintance with its mechanism and use.

"There is an important rule which should influence your management of all paralytic deformities, and also many other cases, especially those in which it becomes necessary to overcome muscular contraction, or to retain muscles in a state of rest for a considerable length of time; it is this: *permit, as far as possible, the natural motion in the parts involved in the deformity.* The joints and muscles of the human body were designed by the Creator of all things for active motion; as far as is practicable the natural movements of the body should be retained, stimulated and strengthened. It is for this reason that all treatment of paralytic deformities by means of *fixed* apparatus is to be condemned. The total, absolute rest which must necessarily occur in a muscle when secured in some fixed apparatus, if too long continued, will certainly induce such structural changes as will preclude all possibility of ever overcoming the deformity by restoring to the muscle its normal power.

"*Adhesive Plaster.*—In all cases where it is desirable to maintain long-continued traction by means of adhesive plaster, the most reliable article that I have used is that known by the name of 'Maw's moleskin plaster.' Plaster spread upon Canton flannel may be used, but it is not nearly as good as the 'moleskin plaster.' I receive complaints almost daily from doctors in the country that they cannot make the plaster stay on more than a day or two. In the first place, they put it on too hot; the heat destroys the vitality of the epidermis, and it peels off the same as from a blistered surface, and, of course, carries with it the point of attachment. In the next place, they do not thoroughly knead the strips of plaster and mould them uniformly to the limb before subjecting them to the strain of traction. If a reliable article is used, and these precautions taken, there need be no trouble with regard to making the plaster adhere firmly to the surface. As an additional precaution, however, it is important that the surface to which the plaster is to be applied should be clean and dry. There is another exceedingly important point relating to its reapplication, as in a second dressing: when the plaster has been on a limb for a long time, and then removed, there will be found more or less dead scarf-skin on the surface; this must be completely removed before making another application of plaster.

"*Elastic Tension.*—Subcutaneous tenotomy was first applied to the relief of deformity in the year 1831, by Stromeyer. That operation marked a new era in orthopædic surgery, and for many years the operation of tenotomy was exclusively relied upon for affording relief of the contracted tendons. Yet, in the progress of time, we have learned still more; and, in my own experience, I have been enabled to test the correctness of the now established principle of *extending a contracted muscle* by the *constant* application of an elastic force, moderately but persistently applied. This will, in the majority of instances, accomplish the object fully as efficiently as tenotomy, where the muscle has not already undergone structural changes, or, in other words, become contracted; and it is infinitely better for the future usefulness of the limb involved, although sometimes much more tedious in producing the result.

"*Operative Treatment.*—Under the head of operative treatment we have tenotomy, myotomy and breaking up of bony and fibrous formations.

"By the term *tenotomy* we mean section of a tendon. The instrument commonly employed for this purpose is called a tenotome. *Myotomy* means section of a muscle. For the purpose of performing these operations you will require knives and tenotomes having a peculiar construction. The handle of the instrument should be so constructed that you may always know in which direction the edge of the blade is turned; this may be indicated by a spot on the handle. If the precaution is not taken, when the blade is buried deep beneath the tissues, you will be ignorant of the exact direction of the cutting edge, a thing always to be borne in mind. The shank should be strong, and firmly inserted into the handle. The blade should be made very thick at the 'heel,' very narrow in the cutting portion, always rounded at the end and sharpened from side to side like a wedge or chisel, so that, when introduced, it splits rather than punctures the tissue through which it passes; the length of the blade should be according to the size of the tendon to be divided. The instrument should be made of the finest-tempered steel, otherwise so small a blade as this, in cutting a permanently contracted tendon or fascia, or any portion of tissue that has undergone structural change, is very liable to be broken."*—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre.

* See page 84.

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Inflammation, Caries.

"It may be stated as a general truth that diseases of a joint commence either in the synovial or osseous tissues, and that they originate for the most part in an acute or chronic inflammation; in the progress of any case both tissues may become eventually involved; when they undergo a change it is secondary to some other affection, either of the synovial membrane or of the bone. When the disease commences in the synovial membrane or in the bone, and disorganization of the joint follows, it is in that tissue in which the disease began that the gravest change will be seen."—T. BRYANT.

Inflammation.

"Injury in some form is generally the cause of inflammation of the joints.

"1. *Serous synovitis* (T. BILLROTH) commences with swelling, heat and pain of the joint, but slight fever; the synovial membrane is slightly swollen and moderately vascular; the cavity is full of serum with synovia, and the remainder of the joint is healthy. The symptoms rapidly subside with rest, painting with the tincture of iodine or applying compresses of wet bandages or blisters; the patient soon begins to use the joint without difficulty, the fluid is gradually absorbed and function is restored.

"2. *Parenchymatous or purulent synovitis* (T. BILLROTH) begins with a chill, high fever, extreme tenderness of the joint, which is fixed, swollen and hot; there is no fluctuation, but the whole limb is cedematous; the synovial membrane much swollen, red, and puffy; there is a little flocculent pus in the cavity, and the cartilage looks cloudy; the difference between the serous and purulent varieties is that in the former the synovial membrane is simply stimulated to secretion, while in the latter it is deeply affected. The treatment at this early stage is: *fixation* of the joint by apparatus in the most favorable position for subsequent use if ankylosis occur, anæsthetics being given if necessary; the gypsum is generally the most available, the limb being well protected by wadding to avoid strangulation (T. BILLROTH); the continued application of ice bags (bladders), so as to effectually cool the entire joint. Before applying these dressings, the parts may be thoroughly painted with tincture of iodine. Opium and quinine should be given, in such measure as will secure relief from the effects of pain and fever. If the disease subsides months may elapse before the inflammation entirely disappears, and great care is necessary to avoid a renewal of the disease by cold or injury. If the disease continues to progress, abscesses form, the joint becomes more swollen, the fever is high, and inter-current chills occur, emaciation follows, with sleeplessness and prostration; in the joint there is a collection of thick yellow pus, mixed with fibrinous flocculi, the synovial membrane is covered with dense purulent rinds, under which it is very red, puffy, partly ulcerated; the cartilage is partly broken down into pulp, partly necrosed and peels off, the bone is very red or infiltrated. The limb being secured in immovable apparatus, with ample fenestræ, open the abscesses and the joint antiseptically, thoroughly cleanse with carbolic solutions, secure free drainage, and give nourishing diet liberally. The patient may recover under this treatment with ankylosis, or metastatic abscess may form in the lungs, liver or other organs, and death may ensue from pyæmia. Occasionally the inflammation extends uncontrollably in and around the joint, the suppuration involving the thigh and leg, followed by great exhaustion, fever and chills. Recovery is still possible, but openings must be made to evacuate the pus, and strengthening remedies given. The antiseptic treatment is most serviceable in such cases (J. LISTER); every collection of pus must be evacuated; all septic matters removed and cavities cleansed with carbolic solutions, and antiseptic dressings applied. The question of exsection or amputation may arise in severe cases and must be determined by the special conditions of each case.

"3. *Chronic synovitis* may result from the acute form, or it may be chronic from the start and remain so. The joint is much swollen, without heat or pain, and fluctuates all over; the fluid collects chiefly in the mucous bursæ adjacent, especially at the knee, where the bursæ under the tendons of the extensors at both sides of the patella and in the popliteal space are greatly distended, while the capsule is less distinctly marked than in acute synovitis; the patient can often walk easily, but much exercise is fatiguing and followed by increased effusion (T. BILLROTH). The cure requires rest to the joint, and change in the synovial surfaces. Rest may generally be best secured by plastic dressing, both in the upper and lower extremity. To effect a change in the synovial membrane apply blisters or iodine; if it still remains filled with fluid, it may be tapped with a fine trocar, and the fluid withdrawn; or, if the fluid return, to tapping add an injection of iodine. The arrest of secretion in the latter case is due to the shrinkage of the serous membrane caused by the action of the iodine with the new formation of the endothelium (T. BILLROTH). Tap the joint carefully with a fine trocar, and, after the escape of the fluid, without admitting air, inject by means of a well-made syringe officinal tincture of iodine and distilled water, equal parts, or, if it is desired to be more cautious, take one of the former to two of the latter; be careful that no air enter the joint; allow the liquid to remain from three to five minutes, according to the pain induced, then let it escape slowly, close the wound and envelope the joint with wet bandages; the operation is not free from danger and may terminate in purulent synovitis (T. BILLROTH). Or, the joint may be irrigated with antiseptics. For the knee use a medium sized trocar and canula, puncture by the inside of the patella near its lower end and withdraw the fluid; then distend the joint with bichloride solution, $\frac{1}{1000}$, and let a stream flow through the joint for several minutes; close the puncture with suture, and apply iodoform dressings.

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Caries.

"Two forms of destructive ulceration occur in the articular extremities of bones, which are liable to seriously compromise joints.

"1. *Simple caries* (E. RINDFLEISCH) attacks the articular ends of bones as a sequel of inflammation of other tissues of the joint; it sets in as soon as the cartilage which coats the articular surfaces is finally destroyed, and the bare bone is left projecting into the cavity of the joint; by mechanical violence minute portions of bone tissue are successively detached with the débris which surrounds them; the ulcer is invariably superficial, sharply circumscribed, and relatively smooth; it is commonly situated where the opposed surfaces are in contact with each other; though slow in its progress it causes extensive losses of substance followed by marked shortening and distortion of the limb. The first symptoms may be slight heat, pain and swelling, followed in a few weeks by gnawing pains and starting of the limb at night from spasms of the muscles, great pain on rubbing the joint surfaces together, contraction of the limb; finally pus forms and abscesses appear with their attendant symptoms (T. BILLROTH).

"The indications of treatment are: tonics, as syr. ferri iodid., and cod liver oil; complete relief of the carious bone from pressure and friction, by extension with apparatus adapted to the special joint involved. If the caries extends, exsection or amputation may be required.

"2. *Fungating caries*, fungous or scrofulous inflammation of a joint, may originate in the synovial membrane, or there may be a central or more rarely a peripheral caries in the spongy epiphysis of a hollow bone or in one of the spongy bones of the wrist or ankle, which may perforate from within outward and excite synovitis; sometimes in the hip, knee and ankle, with the fungous proliferation of the synovial membrane, there is an independent proliferation under the cartilage and between it and the bone, which subsequently unites with that above, so that the cartilage lies partly movable between the two granular layers (T. BILLROTH). More commonly the disease commences as a non-suppurative inflammation of the adjoining epiphyses of two bones where they unite to form a joint; the hyperæmic medulla grows towards the joint, the bony tuberculæ melt away, the cortical portion becomes thin, the exuberant granulations protrude between the cartilage and bone; meantime, the synovial membrane and its connective tissue, the ligaments, and, finally, all of the neighboring connective tissue inflames; a diffuse congestion occurs in the delicate, overlapping fringe of the synovial membrane, from which a membrane of young connective tissue overspreads the cartilage from its edges; the superficial layer of cartilage cells now take part in the inflammation, cells multiply, the capsules open, the young connective tissue forces its way in; finally, the ascending growth meets that which advances downwards, the two coalesce, and the cartilage is perforated (E. RINDFLEISCH). The disease may terminate in resolution, and the parts recover, or pus may form in the joint or in the tissues around it, creating abscesses with sinuses; or the connective tissue may enlarge and degenerate into a firm, white fibroid mass of colossal dimensions, stretching the skin all around the joint and shining through it with a whitish lustre, causing the so-called *white swelling*, tumor albus (E. RINDFLEISCH). The external appearances of the affected joint depend upon the extent of participation of the parts around the joint in the inflammation; there may be no suppuration, but a simple proliferation of granulations which shall lead to destruction of ligaments and displacement of bones; or suppuration may occur in the granulations or synovial membrane, or in the connective tissue; whatever swelling there may be around the joint is due, not to enlargement of the articular ends of bones, which never swell in caries, but to the thickening of the soft parts, or to osteophytes (T. BILLROTH).

"When fungating caries attacks spongy bones, which are largely invested by articulations, as the carpals, tarsals and vertebræ, the bone may be entirely dissolved by interstitial granulations growing all through it, without any necessary accompaniment of the slightest trace of suppuration (T. BILLROTH). But, in the great majority of cases, there is a purulent periostitis, especially of the carpal and tarsal bones, and the disease readily extends to the entire bone and its articular surfaces as it progresses; the sheaths of the tendons become implicated, the skin ulcerates, giving exit to the pus, and the joints swell and lose their shape. The atonic form of inflammation with slight vascularization, which results in carious degeneration of the new formation, the so-called scrofulous caries, is essentially a fungating caries. It occurs chiefly in the spongy bones, the vertebræ, the calcaneum, and epiphyses of hollow bones, and readily combines with partial necrosis.

"*The essential feature of treatment* of a carious joint is *perfect rest* of the part, combined with open air, syr. ferri iodid. and cod liver oil. Rest must be obtained either by position or by apparatus. In the upper extremity both methods may be usefully resorted to, but in the lower extremity apparatus should be so employed as to prevent all injurious movements of the joint, and yet permit of that general exercise essential to the health of the patient.

"The hip, knee and ankle joints may be placed at rest, and efficiently protected by the gypsum bandage, but well-fitted apparatus gives more precision to the efforts to protect them and yet allows free out-of-door exercise. In the early stage this course may secure resolution; later it may be followed by fibrous ankylosis, to be relieved by flexion; finally, in the stage of suppuration, it may result in bony ankylosis. At various stages of progress the question of exsection and amputation will be raised and must be determined. The apparatus necessarily varies at each joint, but the principle is the same."—"Operative Surgery." Stephen Smith.

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Morbus Coxarius.

"Anatomy of the Hip-Joint.—The osseous structure of the hip-joint is made up of the *os innominatum* and head of the *os femoris*, the latter being received into a deep cavity of the former, the *acetabulum*, by a kind of articulation called *enarthroidal*, or ball-and-socket joint.

"The head of the femur and the acetabulum are cancellous in structure, quite vascular, and subject to inflammation. The acetabulum is lined with cartilage at all parts, except at a circular pit (*fundus acetabuli*), which occupies the lower part of the cavity near the notch, and is cushioned with fat. The head of the femur, which fits into and articulates with the acetabulum, is nearly two-thirds of the segment of a sphere, and is entirely covered with cartilage, except at the deep pit, which is for the insertion of the *ligamentum teres*, at its upper and inner face looking toward the cavity of the pelvis.

"The proper ligaments of the hip-joint are the *capsular*, the *ileo-femoral*, the *ligamentum teres*, the *cotyloid* and the *transverse*. The capsular ligament is the largest and strongest capsule in the body. It is attached above to the outer border of the acetabulum and outer face of the cotyloid ligament; and below to the anterior inter-trochanteric line and neck of the femur, which latter it completely surrounds. It is thicker and longer in front than behind, and it is more extensively attached at its upper part, where strength and security are required. The strength of the capsular ligament is further greatly increased by the *ileo-femoral ligament*, which is accessory to it, and extends from the anterior inferior spinous process of the ilium to the anterior inter-trochanteric line. This ligament has been called Y ligament by Dr. Bigelow, of Boston.

"The *cotyloid ligament* is a thick prismatic ring of fibro-cartilage, mounting and attached to the brim of the acetabulum by which the cavity is deepened.

"The *ligamentum teres* is attached by a round apex to a pit just below the middle of the head of the femur; it divides into two fasciculi, which are inserted into the corners of the notch of the acetabulum, and the cotyloid ligament, and is covered by synovial membrane.

"The *transverse ligament* is continuous with the cotyloid, extending from one point of the notch to the other, and completing the circle of the cotyloid ligament, thus converting the notch of the acetabulum into a foramen, through which the bloodvessels enter to supply the interior of the joint.

"The *synovial membrane* is quite extensive, lining the capsular ligament, the free surface of the cotyloid and transverse ligaments and the ligamentum teres, as far as the head of the bone.

"Pathology.—1. The disease may begin as a synovitis.

"2. It may begin in a rupture, partial or complete, of the ligamentum teres, thereby interfering with the nutrition of the head of the femur.

"3. It may begin from rupture of some minute bloodvessels which are situated in the bone just beneath the cartilage of incrustation. This may occur either upon the head of the femur or at some point in the acetabulum, and results from blows, jumping, or anything which may produce a sudden concussion of these articular surfaces. * * *

"Almost all surgical authorities agree that *morbus coxarius* is invariably the result of a contaminated constitution; in other words, that it is essentially strumous in its origin. This has been the universal opinion, and the doctrine has descended from teacher to student, and is still extant among the majority of surgical practitioners. It has been so often taught and enforced, by frequent repetitions, that nobody considered it worth while to question the truth; but nearly all have taken it for granted that an assertion so positively made and universally accepted must be based upon mature investigation. When I first went into the profession I accepted this doctrine taught by our fathers, but must confess that I never was fully satisfied with regard to its correctness. Examination of the cases which have presented themselves to my notice since that time has convinced me that the cachectic condition so often seen is the *result*, and not the *cause* of the disease; for very many of the patients in the earlier stages of the disease have possessed all the appearances of robust health, and in all those cases in which the disease has been cured by nature's method, the patient, subsequent to the cure, has been hale and hearty. * * * The very fact of his becoming vigorous and robust after going through all the exhausting effects of hip-joint disease proves, in my judgment, that the disease is not necessarily of constitutional origin. The additional fact that, in so many cases, the joint has been exsected when the patients have been, apparently, at the point of death, and after the removal of the dead bone have become strong, vigorous persons, is good evidence that the disease is not constitutional. Then there is still a stronger fact that, by treating the disease locally, without reference to constitutional taint, we obtain perfect results, so much so that the patients recover with perfect motion and without the slightest deformity, which is the best proof in the world that the disease is essentially *local* in character.

"I regard the disease as one almost invariably due to a *traumatic* cause, and *not* dependent upon some constitutional taint. * * * It generally requires a very close examination to find out the cause, since the disease does not usually immediately follow the injury, but often first manifests itself weeks, and even months, after the accident that has given rise to it has occurred; so that the patient and his friends naturally enough forget the accident and its connection with the disease, until especially reminded of it in the investigation. •

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"Ordinarily three stages are described:

"1. The stage of irritation or of limited motion, before the occurrence of effusion.

"2. The stage of 'apparent' lengthening, or of *effusion*, the capsule of the joint remaining entire.

"3. The stage of 'shortening' or of *ruptured capsule*."—See "Orthopædic Surgery and Diseases of the Joints." Second edition, page 241. Lewis A. Sayre.

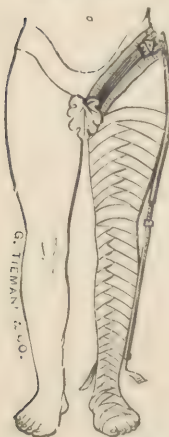
Treatment. Mechanical Apparatus, how applied.

"The treatment of morbus coxarius may be divided into: 1. Local; 2. General.

"Many of the general remedies employed have been given to counteract the scrofulous diathesis which was supposed to underlie these joint diseases. Of course, if the disease occurs in a patient who happens to be scrofulous, it will be necessary to bear in mind the diathesis which complicates the trouble, and employ the proper remedies. But these 'white swellings' of joints have no necessary connection with scrofula, and occur indifferently in the weak and robust, according as the exciting causes, generally traumatic, are brought into action. It would, then, be highly illogical to subject every case of joint disease to a course of anti-scrofulous medication. You will, however, generally find that these patients are benefited by those remedies, such as tonics, cod-liver oil, and stimulants, which are of value in the treatment of any disease of long duration and debilitating tendency. * * *

"The *local treatment*, which has grown into favor during the past few years, but which I have advocated since 1845, is such as to give absolute rest and freedom from pressure of the parts involved in the disease, without materially interfering with the mobility of the joint or ordinary exercises of the patient. Bonnet's method—*fixation without extension*—for local treatment has been the plan abroad. In this country, however, *fixation with extension* has been chiefly employed."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre.

FIG. 4055.
Davis' Splint.



Davis' portable extension apparatus allows mobility of the joint, while it diminishes friction of its surfaces. The apparatus is to be worn when the acute stage is passed. Extension is made from the foot, counter extension from a two-fold perineal band, the outer one of which is rigid, the other elastic, so as to allow elastic extension to a certain point only. It is applied to the limb by means of adhesive plaster strips, secured with roller bandages. It fits either leg. Extension is regulated by a nut and screw.

Sayre's original splint consists of two portions, the upper one is attached, by means of a universal joint, to a pad fitting on the dorsum below the crest of the ilium. The lower portion slides within the first. On its inferior extremity are bands embracing the thigh just above the knee. Extension is made by working the splint with key, *f*. Dr. Sayre now uses the apparatus as modified by himself and shown in Fig. 4058.

FIG. 4056.
Sayres' Original Splint.

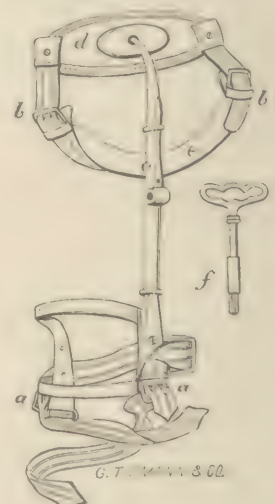
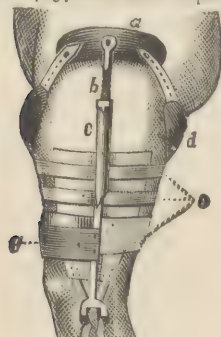


FIG. 4057.--Andrew's Splint.



Andrew's splint consists of:

a. Top pad, applied just below crest of ilium.

b. Extension screw, sliding in tube, *c*, and extension regulated by a nut.

d. Perineal band.

g. Half band of steel in front of thigh.

e. Adhesive straps, fastened to lower end of instrument, both sides of the thigh, by tapes.

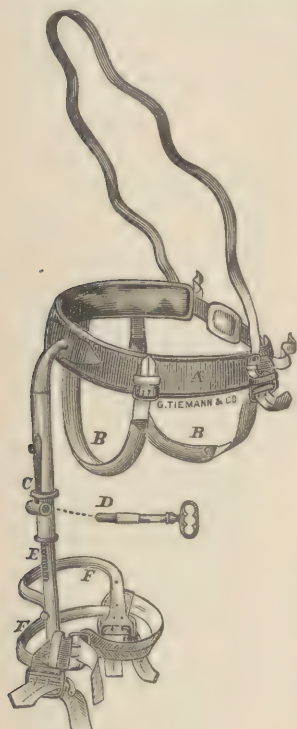
The extension is regulated by a nut, made hexagonal, so as to be turned by a little wrench. The steel semi-circular band, *g*, goes half around the front of the limb, and on the opposite side has a short rod projecting down beside the knee to tie tapes to, like the one shown on the hither side in the cut.

In certain cases it is desirable to use a long splint, coming down to the foot and riveted into the heel of the shoe.

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DISEASES OF THE JOINTS.

Morbus Coxarius Apparatus.

FIG. 4058.
Sayres' Improved Short Splint.

Dr. Sayre says: "Since that time [when he first devised the instrument for the treatment of hip-joint disease, Fig. 4056] I have improved it in many respects, and the instrument I now commonly employ is a short thigh splint," as seen in Fig. 4058.

The following is a description of this instrument, together with the method of application:

It consists of a pelvic band, passing partly around the body under the crest of the ilium, well padded on its inner surface, to which usually two perineal straps are fastened for counter extension; its outer surface holds a ball-and-socket joint, from which runs a steel bar or rod down the outer side of the thigh to within about two inches of the lower end of the femur. This outer bar is divided into two sections, one running within the other, and gauged or controlled by a ratchet and key, which can make it longer or shorter. At the lower extremity of this outer bar is a projecting branch going over to the inner surface of the thigh to receive the attachments of the plaster, hereafter to be described. Both of the lower extremities terminate, as you observe, in a cylindrical roller, over which the tags of the plasters are attached to the two buckles placed at the lower ends of the instrument.

Night or Bed Extension. (Fig. 3913.)

When the short splint is used, some means must be employed for making extension during the night, and also at other times when it is expedient for the patient to lie in bed. This is best effected by means of weight and pulley. To apply it, cut two strips of strong adhesive plaster, two or three inches wide, according to the size of the patient's leg, and long enough to reach from the malleoli to six or seven inches above the condyles of the femur. To the lower end of each strip sew a piece of strong webbing three or four inches long.

"After smoothly bandaging the foot and ankle, apply the ends to which the tabs are attached, one just above either malleolus, and carry the strips of plaster up the inner and outer sides of the leg and thigh, and secure them with a roller, nicking the edges of the plasters to make them fit smoothly, and prevent any folding or creasing.

"The proper method of fastening the plasters to the limb is to allow them to hang loose along the sides, and bring them in contact with it by the successive turns of the roller, for in this way you will be much less liable to wrinkle them, and that is an important item. This may appear to you like an insignificant matter and hardly worthy of special mention; but it is not, for a single wrinkle in the adhesive plaster may, by the irritation it will produce, defeat the whole plan of treatment.

"The tabs should receive a few extra turns of the roller, over one and under the other, weaving them in, for the purpose of making them additionally secure.

"When the knee is reached by the roller, *always* cover it in with the figure-of-eight turn, for the edge of a reverse in the bandage at *this* place may give rise to serious inconvenience and necessitate its entire removal.

"When the bandage has been carried two or three inches above the condyles, the remaining portions of the plasters are to be reversed, and then a few more turns of the roller will, by the bandages adhering to the plaster, fix the dressing so that it will not easily slip.

"The plaster should be applied cold, but when the bandage has been applied the plaster should be moulded to the limb by firmly squeezing it with the hands. It is also very important to secure the plaster above the condyles of the femur, in order that extension may be made upon the thigh and *not upon the lateral ligaments of the knee-joint*. The bandage should then be fastened, and with stitches, for it is to remain a long time. If the limb is held in the proper position, namely, in the *line of deformity, and gentle extension maintained* by an assistant, it can be prepared for the bed-extension and the splint, without giving the child the slightest pain whatever.

"Next take a piece of thin board, about three inches long and two or three inches wide, and arrange across it a piece of tape or webbing so that it shall project three or four inches upon either side. To the ends of these tabs fasten buckles or buttons, that they may be attached to the ends of the tabs upon either side of the limb (Fig. 3913).

"A simpler and more efficient method is to take a round piece of wood, three or four inches long, and having a groove in the centre for the attachment of the cord, and also one on each extremity to hold it in place, where it is buttoned into buttonholes made in the lower part of the tabs attached to the strip of adhesive plaster already fastened

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Morbus Coxarius Apparatus. Sayre's Night or Bed Extension. (Continued.)

to the sides of the limb. To the middle of this foot-board or round stick is attached a stout cord. The object of the board or stick is simply to prevent the bands from making uncomfortable pressure upon the malleoli. At the foot of the bed a pulley is to be arranged in such manner as the ingenuity of the surgeon dictates, the cord from the foot-board placed upon it and a weight attached, just sufficient to make such extension as will render the patient comfortable. For a weight, a bag of shot or sand is most convenient, because the amount can be very easily regulated.

To Apply the Short Splint for Exercising.

FIG. 4059.

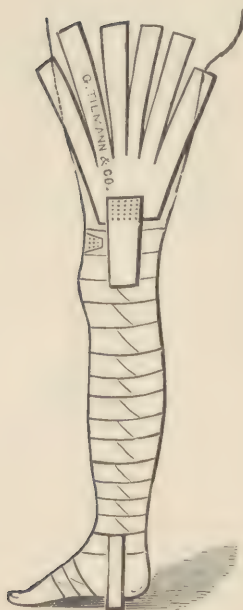


FIG. 4060.

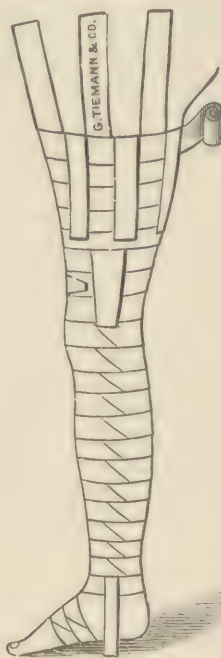
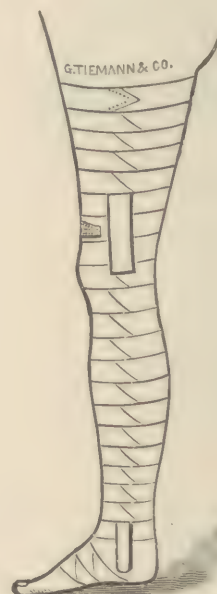


FIG. 4061.



The manner of attaching the plasters for the short or thigh splint is shown above the knee. The manner of attaching the plasters for night or bed extension and for the long splint is shown below the knee.

"To apply the short hip splint for extension while the patient is exercising, the limb should be prepared in the following manner: First cut two triangular or fan-shaped pieces of adhesive plaster, the broad extremities of which should be wide enough to cover about half the surface of the upper part of the thigh, and are to be slit into strips an inch or more in width, for the purpose of permitting a more perfect adjustment, and, also, to be reversed in detail over the bandage. They should be of sufficient length to reach from the knee to the groin. To the narrow ends of these fan-shaped pieces you will sew a piece of stout tape or webbing, something non-elastic, three or four inches in length, and as wide as the cylinder at the lower extremity of the instrument (Fig. 4059).

"Next, place the instrument upon the thigh, with its jaws about three inches above the condyle, and with the thumb and finger grasp the limb at the point upon either side where the instrument comes in contact with it. These two points indicate exactly where the tabbed ends of the fan-shaped pieces of adhesive plaster are to be applied.

"Now, having placed the tabbed extremities over these points, secure them in position with the roller-bandage by first making a few extra turns near the tabs, and then carry the bandage snugly and smoothly over the plaster upon the thigh, until the perineum is reached, when the strips of plaster which are now floating loose are every other one to be reversed as the bandage goes around the thigh (see Fig. 4060), continuing the bandage at the perineum until all the strips of plaster are reversed, and then the bandage is carried down the thigh until the plasters are entirely covered (see Fig. 4061). The effect of all this is to hold the dressing firmly in place.

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Morbus Coxarius Apparatus. Sayre's Short Splint. (Continued.)

"The thigh is now ready for the splint, and, after the shaft has been shortened as much as it can be, we will place it in position with the pelvic cross-bar, at the upper end, just under the crest of the ilium.

"Now, fasten the lower extremity of the splint first, and this is done by passing the tabs around the little cylinders in the jaw upon either side, buckling them as high as possible, and then buckling the strap that passes behind the thigh. Next buckle the perineal bands, drawing them snugly but not too tightly, and see that the smooth side is next to the skin. It is well, also, to lay a piece of old linen in the groin, under the bands, to protect the parts from pressure, and also to absorb the moisture commonly present in this region. The neglect of these little points often gives the patient and the surgeon a good deal of annoyance.

"The instrument now being in position, the nice adjustment of extension is made by means of the key. In this way the exact amount of extension necessary can be applied, and is to be regulated by the following rule: Apply sufficient extension, so that when a sharp, sudden concussion is made from the knee, or the heel when the limb is straight, it will cause no pain whatever; that is all the extension required, and the patient's face is to be our guide in deciding when a sufficient amount has been obtained. More extension than this may give rise to an obstruction of the circulation and do much harm. At night, and at such other times as deemed necessary, the patient is placed in bed and the *bed-extension* adjusted *before the splint is removed or shortened*. So, also, whenever the patient wishes to get up, we apply the instrument and lengthen the shaft, that is, make extension, *before the bed-extension is removed*.

"If the patient is a small child, he may be permitted to wear the splint without using crutches. If the patient be of much size, crutches will be necessary, for the plaster is only intended to retain the instrument in position and maintain sufficient extension to relieve the joint from all pressure, but *not* to support the weight of the body if the child is heavy. If, after the application of the splint, the patient suffers pain, it is evidence that the splint has not been properly adjusted, and it should be carefully examined, for it may be that the plasters have yielded somewhat so as to permit pressure upon the joint. If so, it can be easily remedied by giving a little more extension with the key. Now the patient is in a condition to receive the constitutional treatment so necessary in his case, which consists of beef, milk, bread-and-butter, &c., but, above all, plenty of sunlight and pure air. The apparently trivial points which I wish you especially to remember (for they are really important, and neglect to observe them has many times brought the instrument into disrepute) are the following:

"1. Always shorten the shaft before applying or removing the instrument. 2. See that the jaws are tightly buckled, so that they will not be crowded down, and press upon the condyles. 3. Do not, as I have seen done, tuck the tab between the roller and the buckle. 4. Do not buckle the perineal bands too tightly, for in that manner you may obstruct the femoral vessels; but make the extension with the key, which tightens the band by crowding it upward, rather than by girdling the limb. There is a point with reference to the sound limb that must be mentioned: when the long splint is worn, have the sole of the boot or shoe worn upon that side made extra thick, for the purpose of equalizing the length of the two limbs.

"Finally, it will be noticed that the knee is left to move as freely as it may. I can see no propriety whatever in restraining the movements of this joint in cases of hip-joint disease in its earlier stages, when the thigh is long enough to permit the application of the short splint. There may be other circumstances when it becomes necessary to give the knee support, &c., where the long splint should be employed and the movements of the knee-joint restrained. But all such considerations being set aside, there is no reason why unrestricted motion at the knee may not be permitted. It was designed that the motions of the joints should be free, and no harm will attend this freedom of motion, unless the joint itself becomes the seat of disease; but, on the contrary, restraint will give rise to more or less ankylosis and deformity.

"I resort to the use of the short splint as early as possible, in order that the patient may have the benefit of exercise in the open air. It sometimes happens that it cannot be applied by reason of abscesses, or some other cause. In such cases the bed with extension may be arranged upon some light wagon or wheel-chair, so that the patient can be carried out of doors, and placed as far as possible under the influence of good hygienic conditions. In such cases, however, I more commonly employ the *long splint*, which is a modification of that devised by Dr. C. F. Taylor."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M. D.

DIRECTIONS FOR ORDERING SAYRE'S SHORT SPLINTS FOR MORBUS COXARIUS.

- | | |
|--|---|
| 1. Name of patient. | 5. Circumference of thigh, two inches above knee-joint, Inches. |
| 2. General appearance of patient. | 6. Circumference of middle of thigh, " |
| 3. Circumference of body, between crest of ilium and trochanter major, Inches. | 7. Mention if for right or left hip. |
| 4. Distance from same point to the centre of knee-joint, " | 8. Sayre's improved short splint. |

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Morbus Coxarius Apparatus. Sayre's Long Splint.

"This splint differs from the short one in the following particulars: In the first place, it extends the entire length of the limb, receives the weight of the body at a cross-bar under the foot, has an iron girdle nearly encircling the pelvis and two perineal straps. The long bar, reaching from the pelvis to the bottom of the foot, is hollow, and has another running inside of it furnished with a ratchet and key, by which we make extension, and is locked in the same way as upon the short splint. The cross-bar at the bottom of the splint is covered with leather, and a strong leather strap passes beneath two iron rods, just above the cross-bar, to which are attached the tabs from the adhesive plaster upon the

FIG. 4062.
Sayre's Long Splint.

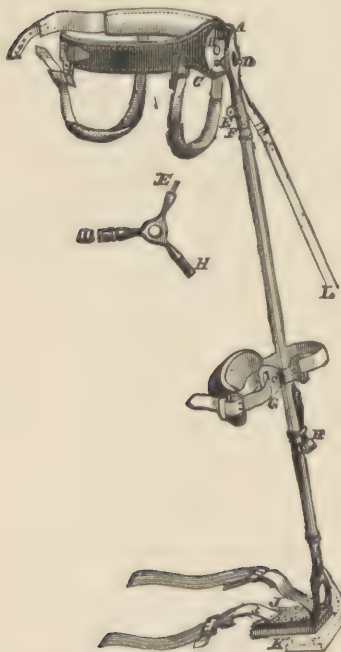
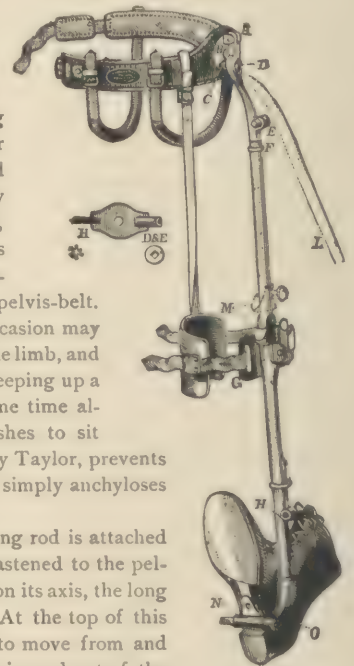


FIG. 4063.—Sayre's Long Splint, with socket, to allow shoe to be detached.



leg. This completes the attachments at the lower portion of the instrument for making extension. There is also a knee pad, which is attached to the bar running along the outer side of the limb in such a manner that it can be moved up and down to any point desired.

"An additional means for applying elastic force is attached to the posterior part of the instrument, which is to be used in cases when the thigh is strongly flexed. It consists of an elastic band, which is attached above the knee, runs along the back of the thigh, and is secured to the posterior portion of the pelvis-belt. This band can be made tighter as occasion may require, for the purpose of extending the limb, and should be elastic, for the purpose of keeping up a constant tractile force, and at the same time allowing flexion when the patient wishes to sit down. A non-elastic strap, as used by Taylor, prevents any motion whatever at the hip and simply anchyloses the joint.

"The improvements are: The long rod is attached to a round revolving plate, which is fastened to the pelvic band; when this plate is moved upon its axis, the long rod moves forward and backward. At the top of this plate another joint permits the rod to move from and towards the other leg. A screw turns in and out of the

revolving plate, so that when the key is applied and the screw turned abduction is made. The long rod is divided into two parts, the lower holds an endless screw transversely, which is worked by a key, and rotation thus produced.

"As a matter of comfort to patients, these long splints are also used with joints at the knee, in slight cases of disease, or when convalescence has definitely set in. These joints are sometimes made with coiled springs at the knee, by which, when the leg is bent backward and the power relaxed, it will spring forward involuntarily.

"The limb is prepared for the long splint in the following manner: Cut two strips of strong moleskin adhesive plaster from two to four inches wide, according to the size of the limb, and long enough to reach its entire length, and divide the upper extremity of the plaster into narrow strips for a distance of two or three inches. Pieces of strong webbing, one or two inches in length, with buckles attached, are sewed to the lower extremities of the plasters. These plasters are then placed on either side of the leg in such a manner as to leave the buckles a little above the ankle-joint, and then so secured by a snugly adjusted roller as to leave the tabs with the buckles attached hanging loose. The roller is then carried up over the knee, and as far up the thigh as can be done with convenience, when the upper split ends of the strips of plaster are reversed and braided in with the roller as it returns down the thigh, securing it smoothly. The stocking is then pulled up on the foot, holes having been cut on either side for the buckles to pass through and the shoe applied with holes cut through it in the same way.

"The limb now being prepared, the instrument is placed on its outer side, and the cross-bar at the bottom brought in front of the heel of the shoe, and securely buckled to the tabs above described. The pelvis belt is next brought around the hips and secured by the buckle upon the opposite side, and the perineal bands are next attached as firmly as may be. The knee-pad band is then slipped up or down until it is made to rest opposite the knee, when it is passed around the leg and buckled. Extension is now made with the key upon the ratchet until free compression is borne

ORTHOPÆDIE.

DISEASES OF THE JOINTS.

Morbus Coxarius Apparatus. Sayre's Long Splint. (Continued.)

without pain and the patient can walk without cane or crutch. If the limb is adducted the abducting screw can be used, daily increasing the tension, for the purpose of abducting the limb.

"If the limb be strongly inverted, the eversion-screw can be used, the force being gradually applied for the purpose of rotating the foot outward; and, if the thigh is strongly flexed, the force exerted by the elastic band upon the posterior part of the splint can be applied for the purpose of producing extension.

"In case you are not able to obtain either a short or a long splint, it is possible to treat the case successfully by means of the bed-extension alone. Another method is, in addition to the bed-extension, to make extension by increasing the weight of the shoe worn upon the foot of the affected limb, and permitting the patient to go about on crutches. This can be done by running lead into the sole of the shoe. In such a case you will be obliged to increase the length of the sound shoe by making the sole of this shoe considerably thicker than the other. In this manner the patient can be up and around a portion of the time—sufficient, at least, to relieve him from the bad influence of continued confinement in bed. These are methods which may be resorted to until proper splints can be obtained."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre.

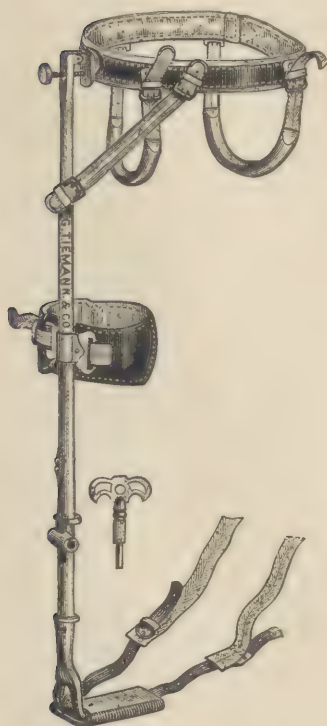
DIRECTIONS FOR ORDERING SAYRE'S LONG SPLINT FOR MORBUS COXARIUS.

1. Sayre's Long Splint, Fig. 4062 or 4063?
2. Patient's name?
3. General appearance of patient, estimated weight?
4. Length from sole of foot to crest of ilium, Inches.
5. Circumference of pelvis, "
6. Right or left leg?

If you wish us to furnish shoes, send the following additional measurements:

- a. Length of sole of foot, Inches
- b. Circumference of ball of foot, "
- c. Circumference of instep, "
- d. Circumference above ankle, "

FIG. 4064.
Taylor's Long Splint.



The splint known at the present day by the name of Taylor's splint (as shown in Fig. 4064) is a modification of his original model, the improvements having been suggested from time to time by various orthopædists. It is very like to the long splint of Sayre, except that with this (Taylor's) rotation cannot be produced.

"In the *Boston Medical and Surgical Journal*, for March 6th, 1879, may be found a very fair enunciation of this gentleman's (Dr. Taylor's) principles concerning the 'mechanical treatment of disease of the hip-joint.' The two following propositions form the key-notes to his practice:

"1st. All organs, while in a state of disease, require rest from the performance of their functions in the direct ratio of the amount, quality and intensity of the abnormal movements. 2d. What is rest for an organ in one condition is not necessarily rest for it in another condition; that is to say, an organ, in a certain degree of *progressive* inflammation, presents conditions essentially different from the same organ in the same relative degree of inflammation in the *retrogressive* stage.

"What he understands by the so-called 'mechanical treatment' is the *working out* to practical conclusions the indications which the above propositions furnish. He aims, in the first place, to overcome contracted muscles by extension and counter-extension. The splint is applied in the line of deformity, and, with weight and pulley fastened to the lower end of the splint, the traction is made.

"The patient, however, is placed on an inclined plane, with conveniences for adapting the angle to the amount of relaxation gained. The force exerted is the extending power of the splint, plus that of the weight, and varies according to the amount required to bring about relaxation—usually from ten to seventy pounds. The recumbent posture is maintained from one to four or five weeks. In addition to the improvement in posture gained, this preliminary treatment, he claims, 'relieves nervous depression, gives time for the patient to accommodate himself to the novel situation, enables us to save the amount of his weight from the perineal straps, and by that amount increase extension and hasten the effects of treatment.'—"Diseases of the Hip." Gibney. 1884.

Measurements required same as for Sayre's Long Splints (Figs. 4062, 4063).

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DISEASES OF THE JOINTS.

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"With the Taylor-Sayre splint it is easy to produce and maintain extension when the patient sits or lies down—but, the moment he commences to walk, the foot approximates the foot piece—the lower extension straps become loose, and the patient is able to swing the limb backward and forward to a very considerable extent. But when the weight is again thrown upon the sound limb, extension again occurs.

"In this instrument, the usual cylinder and pelvic band are employed. But, instead of continuing the extension rod to and below the foot, as in the Taylor-Sayre instrument, it is made to terminate at a point about $1\frac{1}{2}$ inches above the malleoli, and a band is attached which passes half way around the limb, posteriorly. To this band are riveted two straps, which are attached to the adhesive plaster buckles. The foot piece has an independent rod, which passes upward to a piston arrangement above the point of exit of the extension rod. When applied, and the weight of the body is thrown upon the perineal pads, the instrument shortens, by a compression of the spiral spring. In other words, the lower part moves upward and the weight of the body is expended in shortening the spring—the straps remaining taut all the while. The same degree of extension is exerted upon the diseased hip-joint, whether the patient lies down or walks. Traction is constantly maintained, and the joint surfaces are not alternately protected and then exposed at every step. The spring, of course, acts automatically, and, so soon as the foot piece is removed from the ground the instrument lengthens, and is again ready to receive the weight of the patient."—NEWTON M. SHAFFER, M. D.

MEASUREMENTS REQUIRED.

1. Right or left leg?
2. Shaffer's Hip Splint
3. Length from just below the anterior superior spine of ilium to a point $1\frac{1}{2}$ inches above the external malleolus, Inches.
4. Length from the same point to $1\frac{1}{2}$ inches below sole of foot, "
5. Circumference of body between crest of ilium and trochanter major, "

FIG. 4065.
Shaffer's Hip Splint.

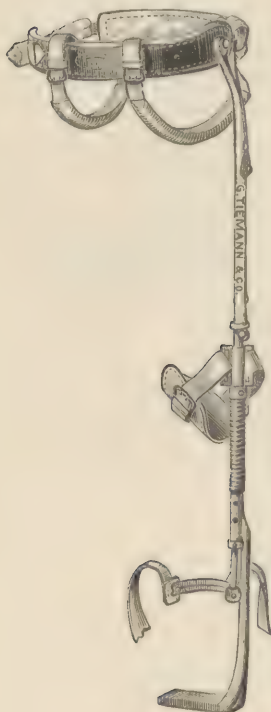
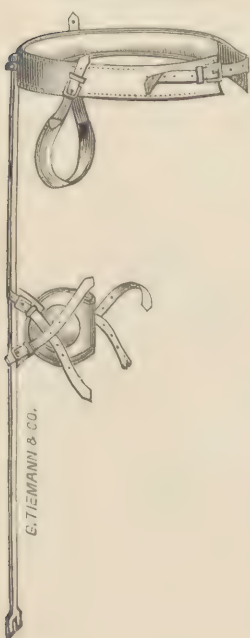


FIG. 4066.
Washburn's Splint.



Washburn's splint is a simple, straight bar of steel, jointed to a pelvic band. It is intended for poor patients, and has neither racks, pinions nor screws. Extension is made, after fastening the lower end with adhesive strips, simply by the degree of tensility to which the perineal straps are adjusted. A knee-cap assists in keeping the splint in place.

DIRECTIONS FOR MEASUREMENT FOR FIG. 4066.

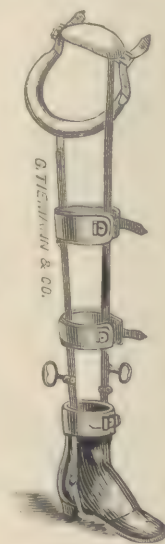
1. Length from ankle to dorsum ili, Inches.
2. Circumference of pelvis, "
3. Right or left leg?

Bauer's-Andrew's splint affords extension in a vertical line, and complete immobility of the joint. By being fastened to the shoe it utilizes the foot for extension, the tuber ischii for counter extension, and the key rack and pinion for a moving power. No adhesive strips are used with this apparatus.

DIRECTIONS FOR MEASUREMENT FOR FIG. 4067.

1. Right or left leg? Inches.
2. Length from the sole to the tuber ischii (sound leg), "
3. Length from the sole to the tuber ischii (diseased leg), "
4. Circumference of calf, "
5. Circumference of thigh, "
6. Measure for shoes as directed on page 643.

FIG. 4067.
Bauer's-Andrew's
Splint.



ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Morbus Coxarius Apparatus.

Hutchison's apparatus is portable, and, being fastened to a shoe, needs no adhesive strips. Two rods of steel extend from the foot to the upper third of the thigh and are secured to the leg with calf and thigh bands. The outside rod, longer than the other one, is ratched, and slides in a steel tube which is hinged by a ball and socket joint to a pelvic band. To this pelvic band is attached a perineal strap for counter extension. Extension is made by working the splint with a key. The splint is provided with joints for the ankle and knee, the latter one is adjustable to any degree of flexion and extension, and may be fixed at any point, or its motion limited, by an arrangement of a screw and two nuts.

FIG. 4069.
Hutchison's Hip Splint.

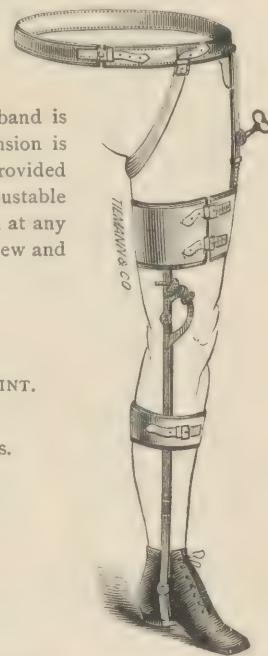
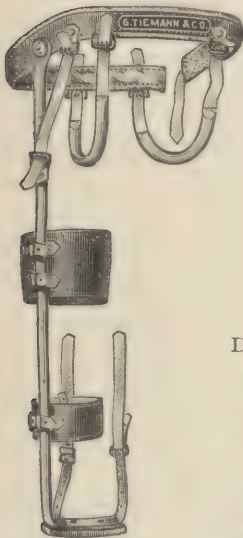


FIG. 4068.
Stephen Smith's
Hip Splint.



DIRECTIONS FOR MEASUREMENT FOR HUTCHISON'S HIP SPLINT.

1. Right or left leg?
2. Length from sole of foot to ankle-joint, . . . Inches.
3. Length from sole of foot to knee-joint, . . . "
4. Length from sole of foot to trochanter major, . . . "
5. Length from sole of foot to crest of ilium, . . . "
6. Circumference of calf, . . . "
7. Circumference of thigh, . . . "
8. Circumference of pelvis, . . . "

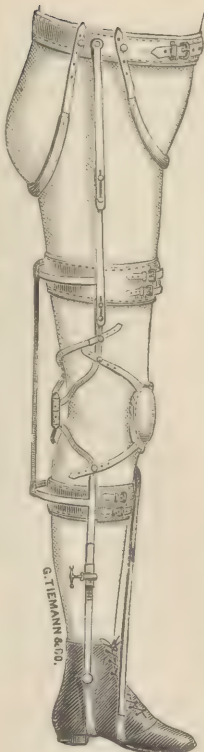
If you wish us to furnish shoes, send the following additional measurements:

- a. Length of foot, . . . Inches.
- b. Circumference of ball of foot, . . . "
- c. Circumference of instep, . . . "
- d. Circumference of ankle, . . . "

Stephen Smith's hip splint (Fig. 4068) makes extension by means of adhesive plaster applied to the leg and attached by buckles to the two ends of the leather strap fastened to the foot-piece; counter extension is made by means of the two perineal pads, fastened to the pelvic band with straps and buckles. At the knee-joint is a movable cross-piece for attaching a leather cap to steady and support the knee. At the bottom is a leather foot-piece to prevent jar in walking. The splint is applied in the same manner as a Sayre splint. Measurements required same as for Fig. 4064.

Eve's apparatus is portable, and, being fastened to a shoe, needs no adhesive strips. The splint is provided with joints for the ankle. Rods of steel extend from the foot on each side of the leg, and are reflected back of the knee-joint, connecting by means of a joint to other rods running up the internal and external aspect of the thigh; these are secured to the limb with calf and thigh bands. The outside rod is hinged by a ball and socket joint to a pelvic band. To this pelvic band are attached two perineal straps for counter extension. Extension is made by means of a rack and pinion moved by a key. A knee-cap, adjusted to buttons on the lateral shafts, exerts pressure on the patella. An elastic strap, buttoned on the semi-circular steel bands covering the thigh and calf bands, controls the degree of extension of the leg.

FIG. 4070.—Dr. Duncan Eve's (Nashville, Tenn.) Leg Extension Brace, with Rotating Joint under the Knee.



ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Morbus Coxarius Apparatus.

FIG. 4071.
Thomas' Posterior Splint.



"Stiff joints are not the result of too long confinement in an immovable apparatus, but rather are caused by permitting movement too soon, that is, before all inflammation has subsided. It matters not from what causes these affections arise, whether from an injury, rheumatic attack, or a constitutional defect, the main thing needful is that the joint be mechanically fixed.

"The patient being placed in the machine, a strap and buckle close the upper circle around the chest, and the limb is bound with flannel from the calf upwards beyond the small crescent. It is advisable that the sufferer should be confined to bed for a short period at the commencement of the treatment, until the night pains and disturbed sleep have ceased. This is the *first stage* of the mechanical treatment. Prescribing for the general health is occasionally required; the surgeon being satisfied that suppuration has been avoided.

"Now comes the *second stage*. The patient is allowed to go about with the assistance of crutches, the frame continued, and an iron patten placed under the shoe of the *sound* limb. These must be continued until the limb is well atrophied around the great trochanter.

"We now come to the *third stage*. The patient takes off the framework in bed and replaces it during the day, still using the crutch and patten for a certain period.

"We now arrive at the *fourth stage*. The patient discards totally the frame, and uses the crutch and patten only. These he sets aside after the surgeon is well satisfied of the permanence of the cure. If the case does not progress to the surgeon's satisfaction, some of these stages must be prolonged.

"The weight of the limb is equal to reducing any angular deformity of the lower extremity, and capable also, in a slight degree, of diminishing any shortening, should absorption of the head of the bone occur—provided a suitable mechanical arrangement is applied.

"The splint ought to be applied at once, whatever the stage of the disease. Forcible flexion, extension, tenotomy, or chloroform, &c., are to be avoided as injurious. Even should the deformity be an extreme one, no violence must be attempted; the limb must be gently persuaded to come back from the erring position, and as the limb assents, the bent of the hip instrument should be altered towards the normal lines.

How to make Thomas' Hip Splint.

"The patient (nude) stands on the *sound* limb; a book or block is then placed under the sole of the diseased one, resting the foot on it. If the spine is then straight, he is ready to have the contour of the sound limb taken. If the spine is not of normal line, then add another or several blocks, until the unsound limb is raised sufficiently to allow the spine to resume its natural condition. Now take a long flat piece of iron, one inch by a quarter for an adult, and three-quarters of an inch by a quarter for children, and long enough to extend from the lower angle of the shoulder blade in a perpendicular line downwards over the lumbar region, across the pelvis slightly external to the posterior superior spinous process of ilium and the prominence of the buttock, along the course of the sciatic nerve to a point slightly internal to the centre of the extremity of the calf of the leg. The iron must be carefully modelled to this track to avoid excoriations, which would otherwise trouble the patient during treatment. This iron forms the upright portion seen in Fig. 4071. It is also very necessary that this upright should come below the knee, to enable the surgeon to fix this joint, otherwise the patient would flex the knee, and raising the leg as a lever would strain the hip-joint.

"Then measure around the chest a little below the axilla, deducting, in the case of an adult, three inches from the chest circumference. This latter will be the measure for the upper cross-piece, which is made of hoop iron, one and a half inch by one-eighth of an inch. The hoop iron is firmly jointed with a rivet to the top of the upright. At one-third of its length from the end next to the diseased side—the upper ring is modelled to the outline of the trunk—it is *oval* in shape, which is important, otherwise the machine will rotate from its position behind the body, also inversion of the limb will occur. Another strap of hoop iron, five-sixteenths of an inch by one-eighth of an inch, and in length half the circumference of the thigh, is fastened to the upright, at a position from one to two inches below the fold of the buttock (Fig. 4071), according to the age of the patient; then another piece of metal of like strength equal to half the circumference of the leg at the calf is firmly riveted to the lower extremity of the upright. The short portion of the top half circle is next to the diseased side, while the long portion must be closely fitted to the sound side. In my earlier experience the upper crescent embraced the pelvis instead of the chest, but I found it very inefficient, difficult of application, and painful to wear. The instrument is now ready to be padded and covered.

"However correctly it may have been modelled, it will often occur that some slight alteration will be demanded when it comes to be applied to the patient, either on the first day, or at some period during the progress of the case."—"Diseases of the Hip, Knee and Ankle Joints." Hugh Owen Thomas.

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

FIG. 4072.
Hutchison's Extension.

**Morbus Coxarius Apparatus.**

"With this apparatus (Fig. 4072) extension is made by the weight of the suspended limb, which is equal in weight to one-fifth of the whole body, is greater than the weight ordinarily employed for extension, and is quite sufficient to subdue the spasm of the muscles which crowd the head of the bone into the inflamed acetabulum, and is the chief cause of the pain which the patient experiences. To the shoe of the sound limb a steel plate corresponding to the sole of the shoe is attached by upright rods two and a half inches in length, so as to raise the foot from the ground; it is the shoe ordinarily used for shortened leg. This elevated shoe and a pair of crutches constitute the apparatus. As the patient stands on his crutches the diseased limb is suspended."—"Proceedings of the Medical Society of the County of Kings," April, 1879. J. H. Hutchison, M. D.

Wyeth's Combination Method.

"Since in all cases some time must elapse between the discovery of the lesion and the preparation of the mechanical apparatus, it is a wise practice to put the patient to bed at once, and apply the extension as follows: Cut two strips of moleskin plaster, from one inch and a half to two inches wide, and long enough to extend

FIG. 4073.
Wyeth's Combination Method



from six inches above the trochanter to below the sole of the foot. Adjust one to the outer and one to the inner aspect of the thigh, allowing the upper end, which is to be doubled back upon itself and woven in with the roller, to extend four or five inches above the level of the trochanters. Mould them carefully to the contour of the limb, bringing the strips exactly over the inner and outer condyles of the femur, and hold them by a well-adjusted bandage, beginning from above. In order to prevent the plaster from wrinkling, it is necessary to clip it at intervals of an inch or two, with scissors, obliquely upwards from each edge. The strips should be made to adhere to the skin to within six inches of the malleoli, not so much that traction below the knee is necessary, but because the complete extension of the leg and thigh enforces more perfect quiet. The bandage is commenced just at the level of the great trochanter, and that portion of the strips which extends above this is to be turned down and worked in with the roller. That part of the plaster which is exposed near the foot should be doubled by laying a second strip of equal width on this, the adhesive surfaces coming together. In this way it is not only strengthened, but is prevented from sticking to the dressing.

"The extension weight—varying from two to seven or eight pounds—is applied as in Buck's apparatus (page 583). The dorsal decubitus should be maintained, for, if the sitting posture is assumed, the iliacus and psoas muscles are not materially affected by the extension. To secure this result the long splint of Hamilton should be applied from the axilla along the thigh and leg, and firmly secured by a bandage carried around the chest, pelvis and thigh.

"As soon as the thigh is fully extended a Sayre's long splint (Fig. 4063) should be adjusted, and the high shoe and crutches of Hutchison's. The lower end of the rod of Sayre's splint is turned at an angle of 90° to the shaft, and fitted with a spring catch into a socket on the sole of the shoe. In applying the instrument, shorten the shaft as much as possible, fasten the belt around the pelvis just above the trochanters, and then the perineal bands, one on either side. The shoe is put on, the spring-catch fixed in the socket at the sole, and the knee-pad buckled. The shaft of the instrument is now lengthened by the key until a fair and comfortable degree of extension is secured.

"The shoe upon the foot of the sound side should be raised from one inch to one inch and a half, and the patient made to walk about on crutches. Upon retiring for the night the extension employed at first should be resumed. This, the combination method, is shown in Fig. 4073. The advantages of this plan of treatment are: 1. The patient is able to move about and obtain the benefit of out-door life, while the hip is held in extension and practically immovable; 2. The high shoe and crutches hold the lame foot and leg suspended; 3. In case of a fall, the splint prevents concussion in the joint; 4. The night extension prevents spasmodic contraction of the muscles and pain from unguarded movements during sleep."—"Text-Book on Surgery." Wyeth.

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

FIG. 4074.—Stillman's Sector Splint.

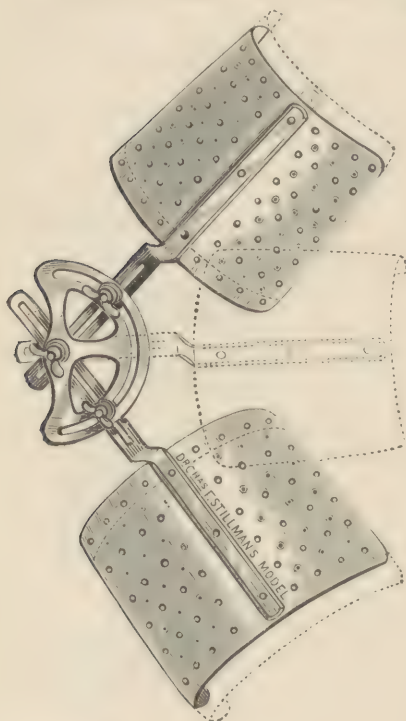
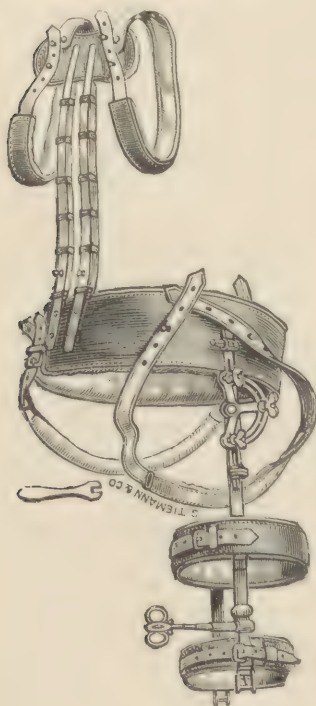
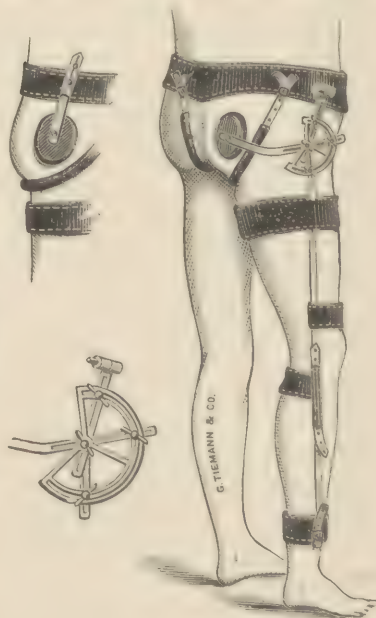
FIG. 4075.
Stillman's Hip Brace, No. 1.

FIG. 4076.—Stillman's Hip Brace, No. 2.

**Morbus Coxarius Apparatus.**

"The sector may be inserted into any form of brace attachment known. But when it is desired that the splint should remain upon the limb for any length of time, or, as in acute inflammation of joints, where it is used to reduce the contractile antagonism of the muscles, I prefer to use it in the form of a bracket, which is to be attached to the affected part by some immovable dressing which will be sufficiently inflexible to prevent unequal pressure upon the soft parts.

"The sector bracket consists of two terminal plates of thin copper, perforated upon the upper side, connected with each other by a bridge raised to any desired distance from the surface. This bridge consists of two over-riding slotted steel strips, and is connected by three clamps which may be either thumb-screws or key-clamps.

"This splint is capable of the following combination without removal from the limb: 1. Extension at any angle with motion; 2. Extension at any angle with fixation; 3. Fixation at any angle; 4. Motion, complete or limited; constant or occasional; 5. Exposure of surface about the joint, admitting compression, applications and easy inspection."—CHAS. F. STILLMAN, M. D.

Fig. 4075 shows a hip brace provided, *first*, with a back frame; *second*, with sector at the hip; *third*, with a clamp above the sector for fixing the angles of abduction and adduction, and one below for fixing the angle of rotation. These are changed by the wrench shown in the illustration. The sector is operated by thumb-screws, and is provided with a removable clamp by which motion in the hip may be limited to any given arc. Two pieces of moleskin plaster with webbings attached are placed on the thigh, as in applying Sayre's brace.

To apply the brace, the clamps and straps are all loosened and the extension ratchets shortened as much as possible. The pelvic band is then fastened around the pelvis and the two perineal bands buckled tightly in place. The shoulder straps and abdominal band are then buckled, so as to secure the back frame tightly against the back. The thigh is next to be attached, the webbing tabs are to be passed over the rollers at the end of the brace and buckled tightly, the girths around the thigh having been previously buckled.

Traction may now be exerted, either under chloroform, which is the better, or gradually by the hand until the limb is in the position desired, when the clamps are tightened, thus fastening the thigh on the pelvis. Extension is now to be exerted by the key. The addition of the high heeled shoe on the sound limb, and a pair of crutches (Hutchison's physiological method) completes the outfit.

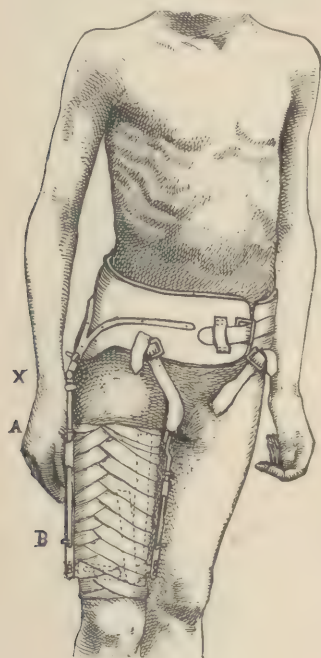
ORTHOPÆDIE.

DISEASES OF THE JOINTS.

Morbus Coxarius Apparatus.

"Fig. 4076 illustrates a form of brace which the writer uses to advantage, and in which the posterior pad is a prominent feature. This affords sufficient leverage behind the joint to overcome flexion and avoid lordosis without the use of the back frame. In this brace the extension is produced by an elastic ratchet, in addition to that produced over the joint by the sector mechanism. The splint is extended to the ankle and secured by adhesive plaster strips."—Chas. F. Stillman, M. D., in *Medical Record*, June 14, 1884.

FIG. 4077.—Roberts' Short Splint.



"This instrument consists of a pelvic and a femoral segment. The former is made of very thin sheet steel or copper, covered with leather on the outside and thoroughly upholstered on the inside. It is broad, and, to secure a good fit, is fashioned over a plaster cast of the patient's pelvis. The femoral segment is composed of two compound side bars with elastic attachments and a broad metallic band which encircles the thigh above the knee.

"The expanded margins of one of the side bars have been turned over, so as to form a shell through which the other bar slides. The upper end of this shell is converted into a loop which completely closes over the sliding bar, and upon this a brass pin is soldered. The lower end of the other bar (sliding within the first) is likewise provided with a pin. Any force which brings these two pins nearer together must of necessity lengthen the instrument, and consequently exert a *tractile* force upon the limb to which it is attached. In order to make this tractile force *elastic* (like manual traction) a narrow strip of strong elastic webbing is buttoned to the brass pin, at *A*. To the pin, *B*, at the opposing end of the other bar, a buckle is attached.

"The instrument having been applied and secured in position by means of adhesive plaster and roller bandages, with the brass pins at the greatest possible distance apart, we can, by means of the elastic webbing and buckle, exert any amount of continuous elastic force. In this way the traction force is graduated. The distal ends of the bars with expanded margins are attached to a metallic ring which encircles the thigh just above the knee. By means of strips of strong adhesive plaster, placed longitudinally around the thigh, the lower ends turned up over it, the band is retained in position. It is further secured by a roller bandage and thus prevented from being pushed down over the knee when traction is made as above described.

"A simple hinge-joint connects the outer side-bar with the pelvic segment. Passing over this joint in front is a semi-circular rod upon which a coiled steel spring is placed, the action of which is to oppose flexion of the thigh on the abdomen. An adjustable nut on the curved rod furnishes the surgeon with the means of exercising his discretion as to how much motion at the joint shall be permitted. A ball-and-socket joint connects the proximal end of the inner side-bar with an upholstered perineal saddle, which latter device is connected with the pelvic segment by means of two straps, one passing up anteriorly, the other posteriorly. A perineal strap on the unaffected side passes to the pelvic segment in front and behind. These two joints permit of the movements of flexion, and extension at the hip, during locomotion, and in changing from the standing to the sitting posture or the reverse."

Dr. Roberts advises the short splint only in cases where convalescence is in progress; the patient having a long thigh to which the instrument can readily be attached.

Roberts' Long Splint (Fig. 4078).

"The same principles of treatment can be enforced and greater supporting power afforded by the long splint. This consists of four segments which respectively correspond to the pelvis, thigh, leg and foot. The pelvic and femoral segments are identical in construction with the corresponding parts in the short splint, excepting that a ratchet clamp joint, as introduced by Dr. Stillman, permits of rotation. Like the short splint, this instrument is constructed to exert elastic linear traction. The segments corresponding to the thigh and leg are both provided with compound or sliding side bars, pins and elastic straps. A universal joint connects the inner lateral shaft with the upholstered perineal saddle. From the lateral bars of the splint, just below the knee, projects anteriorly a semi-circular piece. Attached to the middle of this is an adjustable metallic arm projecting downwards in a line with the spine of the tibia. From this arm, as a fixed point, there extends a broad elastic band around the leg behind the head of the tibia, which serves to keep the instrument constantly in the same relative position to the limb. From the semi-

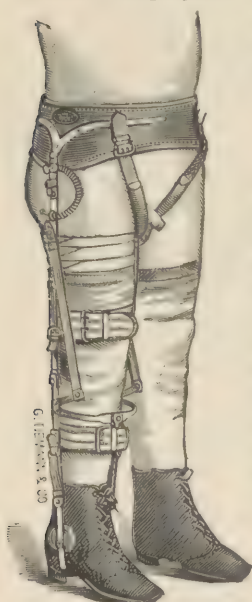
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circular piece on either side, at the points of its attachment to the lateral shaft of the splint, project directly forward metallic levers curved upward. To these levers are attached strong strips of elastic webbing which pass upward to the pins. These elastic straps are designed to supplement the function of the quadriceps extensor muscle.

FIG. 4078.
Roberts' Long Splint.



"At the junction of the leg with the foot segment, a French joint permits of their easy disarticulation, a matter of convenience in applying the splint. In the application of the instrument, long and broad strips of adhesive plaster are used in precisely the same manner as in the application of a Sayre splint, the lower ends tipped with non-elastic webbing passing through buckles attached to the shoe on either side. The shoes should fit the feet well, be made to lace, and should be provided with a low broad heel of soft rubber."—"Fundamental Principles of Mechanico-Therapy in Hip Disease." Dr. M. J. Roberts.

"The splint devised by Dr. Willard, of Philadelphia, has a single joint opposite the articulation, so that the patient can sit down with comfort. It is made of leather, moulded wet over a cast. After it has set and thoroughly dried, the pelvic and thigh portions are separated, and connected again by a joint attached to two spreading steel arms, as seen in Fig. 4079. A mortise or slot is made in the thigh section, and into this slot fits a bolt with a knob or head, by means of which it can be worked through one's clothing. It is only a *fixed* apparatus when the patient is standing and when the bolt fits into the slot. Dr. Willard says it is applicable to a limited number of cases, *i. e.*, those in which the inflammatory symptoms are not acute. It is always used in connection with crutches and a high shoe."—"Diseases of the Hip." Gibney.

FIG. 4079.—Willard's Splint.



Treatment after Exsection.

"Sayre's cuirass is an apparatus which will secure *absolute rest* and a *proper position* for a length of time. It is a modification of Bonnet's *grand appareil*, and consists of a strong wire netting, well padded inside.

"The cuirass being properly prepared, the patient is laid in it so that the anus is opposite the opening, and free from any possibility of obstruction, when the well leg is first to be dressed. This is to be done by making the leg perfectly straight and screwing up the foot-rest until it is brought firmly against the heel of the patient, placing a pad between the foot and the rest to absorb the perspiration. The instep is then well padded with cotton or a blanket, and a roller is carried firmly around it and the foot-rest, running up over the limb; but, before going over the knee, a piece of pasteboard or leather or several pieces of folded paper, are placed over the leg, knee and thigh, and the roller carried firmly over this extemporized splint for the purpose of preventing the slightest bending of the knee, when the roller is carried up the entire length of the thigh, around the perinæum and over the outer arm of the instrument, and several times back through the perinæum, and then across the pelvis, by which means the well limb is made a firm counter-extending force.

"Two strips of adhesive plaster, two to four inches in width, according to the size of the patient, are then placed upon either side of the operated limb, and secured with a nicely-adjusted roller over the foot and up the leg and thigh, as far as the abscesses on it or the wounds will permit, being careful to leave a sufficient length of the plasters at the lower extremity free, for the purpose of applying them to the foot-rest where extension is made. The foot-rest is then screwed up to meet the heel of the shortened limb, and these strips of adhesive plaster are brought down around the foot-rest and securely fastened. The foot-rest is then extended by the screw, slowly and gradually, at times waiting a few moments for the muscles to yield, which have been so long contracted, until the limb is brought down to its full extent. It sometimes happens that, from long contraction of the adductors and the tensor vaginæ femoris, subcutaneous section of those tendons and fascia will be requisite before the limb can be brought to its proper position, even after the head of the femur has been removed. After the limb is brought into this position a roller is carried from the foot over its entire surface; a large wad of oakum is placed around the wound to absorb the discharge, and the

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roller is carried firmly over the wound, inner surface of the thigh, and around the pelvis. I place great importance upon this latter part of the dressing, as we thereby compress the tissues and prevent the burrowing of pus—the oakum, which has already been placed in the wound, allowing of free drainage, no matter how tightly the roller may have been applied.

“Immediately after the patient is dressed in this way and has recovered from the anæsthetic, he is capable of being stood up against the wall, or of riding out in a carriage or boat, and can take his daily exercise in this way. I have, in several instances, had patients removed a long distance, some miles, in fact, within an hour of the operation, and without the slightest inconvenience or pain. The dressing will probably not require to be changed for from forty-eight to sixty hours, or until secretion has been formed to moisten the dressings, when the oakum plug can be removed without hæmorrhage. If this dressing does not come away easily, warm water injections will readily float it out.

“The wound, made clean, is again filled with Peruvian balsam and dressed as before. After this it may require dressing once or twice a day, according to the amount of discharge; and the child should be removed from the entire instrument as often as is requisite. The well leg should be removed from the wire breeches at least once a week, every day is better, and free movements given to all the joints, ankle, knee and hip, otherwise we may ankylose them, although they are not diseased. The wire cuirass should be used for from a month to two months, according to necessity, after which the patient can be put upon the long or short splint and allowed to exercise, thereby increasing his prospects of perfect motion in the new joint.

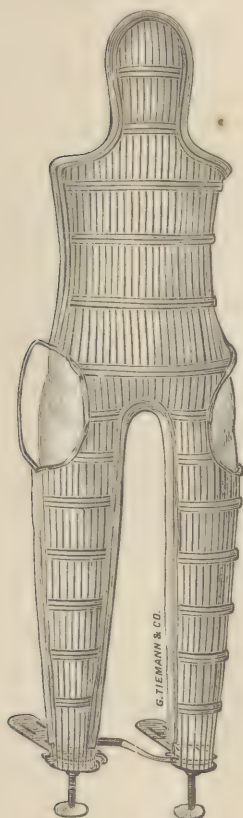
“The reason for stuffing the periosteum with oakum is because we wish it to retain its proper shape, to mould the material thrown out for the formation of the new bone that is subsequently to bear the entire weight of the patient. If this precaution is taken we may have a femur nearly as well formed as the original bone, and equally as serviceable.

“The long and short splints and the modes of their application have already been described, and, when the patient has recovered from the operation sufficiently to wear one of them, the after treatment of the case is to be continued upon the same general plan as that which guides us in the treatment of cases where no operation has been performed.

“The wound should be kept thoroughly cleansed, and every precaution taken to secure a free discharge, so as to prevent the formation of abscesses in the surrounding tissues. When the discharge begins to cease you may commence passive motions, and these should be regularly and systematically resorted to; slight, at first, but gradually increased as recovery goes on.

“If this treatment is faithfully persisted in you will be able, in the majority of cases, to obtain a much more useful limb than nature can ever produce when she is permitted to effect a cure according to her own method.”—“Lectures on Orthopædic Surgery and Diseases of the Joints.” L. A. Sayre, M. D.

FIG. 4080.
Sayre's Cuirass.



DIRECTIONS FOR MEASUREMENT.

1. Patient's name.
2. Patient's age.
3. Patient's weight.
4. Length from sole of foot to axilla, Inches.
5. Length from sole of foot to perinæum, "
6. Circumference of calf, "
7. Circumference of knee, "
8. Circumference of thigh, "
9. Circumference at the nates, "
10. Circumference of pelvis at iliac crests, "
11. Circumference of waist, "
12. Circumference of chest under axillæ, "
13. Length from top of skull to vertebra prominens, "
14. Length from vertebra prominens to perinæum, "
15. Circumference of the head, "
16. Circumference of neck, "

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FIG. 4081.
Bauer's Wire Breeches.



Bauer's wire breeches are used after excision of the head and neck of the femur in necrosis, after the removal of shattered bone, or balls in gunshot fracture, and in the treatment of chronic inflammation of the hip joint when perfect rest and position of the affected parts are desired. It consists of a heavy wire frame covered with wire gauze to fit the posterior half of the body from the axillary cavity to the sole of the foot.

Proper sized openings may be cut through the gauze to admit of dressing any wounds, without being obliged to remove the splints. There is also an opening for the anus, so that the patient can pass his fæces by having the lower end of the apparatus raised and a bed-pan placed under it. The apparatus may be lined with cotton batting, and the patient securely fastened with adhesive plaster strips and roller bandages. After the feet are secured to the foot-board, extension can be made by turning the thumb-screws, counter extension being from the healthy extremity.

DIRECTIONS FOR MEASUREMENT.

- | | |
|--|---------|
| 1. Patient's name. | |
| 2. Patient's age. | |
| 3. Patient's weight. | Inches. |
| 4. Length from sole of foot to axilla, | " |
| 5. Length from sole of foot to perinæum, | " |
| 6. Circumference of calf, | " |
| 7. Circumference of knee, | " |
| 8. Circumference of thigh, | " |
| 9. Circumference at the nates, | " |
| 10. Circumference of waist, | " |
| 11. Circumference under axilla, | " |

Use of Sayre's Cuirass in cases in which the Child is too small for the Hip Splints to be applied.

"I present to you to-day the case of a little child, eighteen months of age, suffering from hip joint disease in the second stage. On account of the small size of the child I deemed it inexpedient to attempt to apply the long hip-splint, and therefore directed her to be placed in the wire cuirass. When I first saw her there was an enormous abscess at the joint, which I believed, at that time, to be extra capsular. This was aspirated three times, in the hope that by this means, and by compression afterwards applied, the walls would become agglutinated and thus all further trouble in regard to the abscess be done away with. I gave her the benefit of the doubt in this case, in order, if possible, to avoid an incision and the appearance of the resulting cicatrice from this treatment. It, however, was of no avail, the abscess still continuing to fill up. I therefore made a free incision down to the lower border of the abscess, by this means securing thorough evacuation of its contents; then washing it out thoroughly and inserting a rubber tube I maintained perfect drainage. As I remove this dressing, you observe that the parts are now in a healthy, granulating condition and the limb is of normal size; perhaps somewhat smaller than the other, owing to its confinement. Having removed all dressing from the limb, I carefully lift up the cuirass at the same time that I make a slight traction upon it. This you must be careful to do, otherwise you will cause pain by your manipulations. As I now hold the leg in this position, with my other hand under the thigh, I can make quite free motion within the joint in all directions, without causing pain, as is shown by watching the face of the child. I see no reason, therefore, why we should not secure the most satisfactory results in this case and restore this child with perfect strength and motion in this now diseased limb. Before a year has expired I hope to be able to apply the long hip splint.

"In relation to the wire cuirass in cases of very small children suffering from hip disease, in which the long splint cannot be applied, I cannot speak too highly. By means of the screws attached to the foot plate you can secure any amount of traction you desire, making counter traction, as is done in this case, by passing a roller bandage under the perineum and up over the handles of the instrument, which are midway between the thigh and shoulder. In this position, the anus being directly over the opening in the back of the instrument, the child can relieve its bowels without disturbing its position, and the parts can be cleansed by the mother without soiling the clothing or person of the child, the instrument at that point being covered with rubber cloth. She can, thus secured, be placed in the upright position. In this position she can be placed by the window, in order to secure the benefit of the fresh air when the mother is not at liberty to take her out."—From a Lecture by Lewis A. Sayre, M. D. *Medical News*, Aug. 2, 1884.

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Morbus Coxarius Apparatus.

FIG. 4082.
Hamilton's Splint, Front.

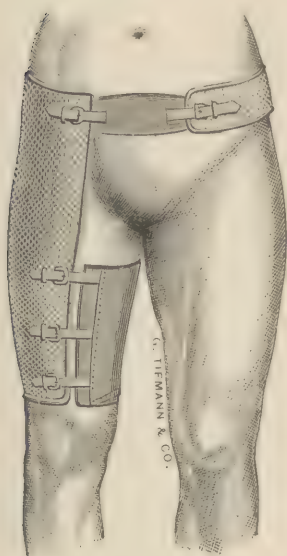
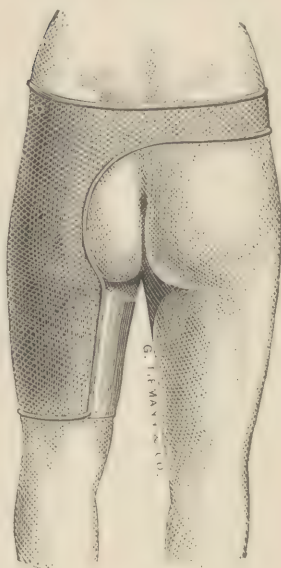


FIG. 4083.
Hamilton's Splint, Back.

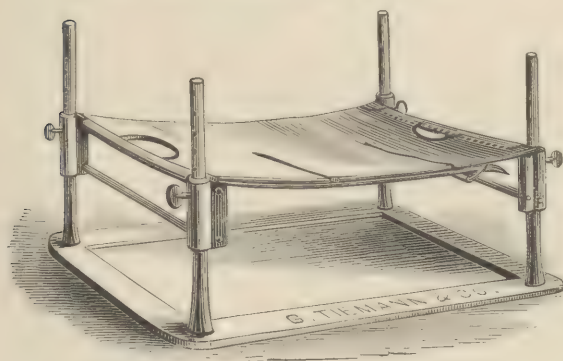


This splint consists of an iron wire frame, moulded to the outside or back of the pelvis and thigh, covered with wire gauze. It is kept in place by a pelvic and a broad thigh-band, and secured with buckles. Dr. Hamilton advises its use whenever it is desirable to secure *immobility* of the joint, together with exercise in the open air.

DIRECTIONS FOR MEASUREMENT.

1. Name of patient.
2. Age of patient.
3. Weight of patient (estimated).
4. Right or left side. Inches.
5. Crest of ilium to the condyles of the femur, "
6. Circumference of pelvis at iliac crest, "
7. Circumference at the nates, "
8. Circumference at upper part of the thigh, "
9. Circumference of thigh above the knee, "

FIG. 4084.—Wackerhagen's Bed Rest.



"In order to overcome some of the difficulties in the management of inflammation at the hip joint, I have had an apparatus constructed by which I can keep the pelvis and affected joint fixed, and in position, and also apply counter-extension without producing excoriation of the integument at the groin.

"The bed represented in Fig. 4084 is made of iron and constructed for a child six years of age. It consists of a frame base, measuring twelve inches in its antero-posterior-diameter and seventeen inches transversely—four iron rods are fastened perpendicularly to each corner. The surface on which the pelvis is fixed is of leather, and is arranged to slide up or down on the perpendicular rods, and may be fastened by the screws. Anteriorly, the leather is slit up about five inches, and the under surface is supplied with straps and buckles. By this contrivance the alvine evacuations may be passed without soiling the apparatus. The leather surface having been padded with cotton, the pelvis and affected joint are firmly bandaged thereto. Extension is made by weight and pulley after Dr. Buck's method."—G. WACKERHAGEN, M. D.

plied with straps and buckles. By this contrivance the alvine evacuations may be passed without soiling the apparatus. The leather surface having been padded with cotton, the pelvis and affected joint are firmly bandaged thereto. Extension is made by weight and pulley after Dr. Buck's method."—G. WACKERHAGEN, M. D.

KNEE JOINT APPARATUS.

Sayre's Method.—"The most important element in the treatment of injuries of the knee, in the earlier stages, is *absolute rest*; no matter whether the ligaments or the synovial membrane is the part chiefly involved, or whether there is extravasation of blood beneath the articular cartilages or synovial membrane. You may secure such rest for the joint in any manner you see fit. In many instances it is, doubtless, the safer plan to carefully adjust a posterior splint, made of sole leather, felt, or other material, according to the convenience of the surgeon, which shall extend along the upper portion of the leg and lower portion of the thigh, and hold the articulation and its surroundings perfectly fixed. Place the patient in bed at once and keep him there until recovery is well advanced.

"If the ligaments are the parts chiefly affected, you will not ordinarily have much difficulty with the case. Sometimes simply applying a bandage around the knee will give sufficient support and secure sufficient immobility to

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DISEASES OF THE JOINTS

Knee Joint Apparatus.

FIG. 4085.—Sayre's Rubber Compressor, for Knee and Ankle Joint.



meet all the indications. The posterior splint and bandage will certainly fulfill every indication. The joint may be kept wet with hot or cold water, according to which affords the greater relief to the patient. After a few days have elapsed, when probably most of the acute symptoms will have subsided, you may write for a liniment, if the patient cannot be induced in any other way to give the joint a liberal amount of hand-rubbing and passive motion. These cases are usually slow in recovering and it may be well to communicate this fact to the patient at the beginning. Treatment should continue until pain and tenderness have entirely subsided. The principles of treatment are, *perfect rest*, hot or cold applications, according to the feelings of the patient, and firm compression. Compression can be secured by means of a roller-bandage, sponge and bandage, or by means of a double india rubber bag. The latter is the best mode, especially for the knee joint. This bag can be partially filled with either hot or cold water, as may be indicated, and then, being distended with air, you have even compression, with the advantage of a hot or cold poultice, as may be desired.

"When, however, the synovial membrane becomes involved in the injury, either alone or associated with injury to the ligaments, a much more serious condition of affairs is present and will (in a majority of cases) require a more active plan of treatment. When the injury has been followed by effusion into the joint, next to absolute rest, *elastic compression* is the most essential element in the treatment. Place the patient in bed at once. It may be, and quite probably will be necessary, in a majority of cases, to make some local depletion, by means of leeches or wet cups, before resorting to any measures for the purpose of promoting absorption of the fluid. The necessity of local depletion, and its amount, will be decided by the vigor, general health of the patient and the degree of inflammatory action present, as manifested by increased heat about the joint, increased frequency of pulse, pain, and general constitutional disturbance. After local depletion, hot fomentations and elastic compression, secured either by means of a fine india rubber bandage, or by the double india rubber bag before referred to, will be of the greatest possible service. If absorption of the fluid does not take place rapidly under this treatment, counter-irritation may be resorted to, by applying blisters above and below the joint. Never apply your blisters directly *over* the knee joint, but apply them above the capsular ligament and below the ligamentum patellæ. In addition, iodine ointment may be applied over the joint and covered with oiled silk. Never use iodine locally in the form of tincture. The objection to iodine in the form of tincture is, that it renders but little service, except when its effect as an escharotic is desired; but, used in the form of an ointment, scarcely any pain is produced, no exfoliation of the cuticle follows and, therefore, absorption can go on, and in this manner the remedy renders continuous service.

"When the acute symptoms have subsided, great benefit may be derived by freely shampooing the parts, slightly lubricated with cosmoline, vaseline, or any substance which will permit the hand to glide over the surface freely without producing too much irritation to the skin. Friction should be applied in this manner with very great freedom for from twenty minutes to half an hour each sitting; and, while one hand is made to do rubbing *around* the joint, the other hand should rub up and down upon the limb above the joint, thereby facilitating the absorption of the effused fluid. If the case does not yield to this treatment, and the effusion increases, so as to make tension sufficient to paralyze the absorbent vessels, it may be necessary to *aspire* the joint and remove all the fluid possible. In many instances, if only a small quantity of fluid is removed, the tension upon the absorbent vessels will be relieved to such an extent that the remainder may be absorbed by the means already mentioned. Sometimes, however, it happens that the fluid contains so much flocculent material that it cannot be removed by the aspirator. Under such circumstances no hesitation need be made with regard to opening the joint (with the knife) and giving free discharge to the fluid. If you puncture this joint in such a way as to admit air, the consequence will be very serious indeed, because decomposition of the contents of the synovial sac will take place and you will have excessive fever and suppuration will be set up. I am not afraid of *air*, but I fear *imprisoned air*. Therefore, if compelled to make an opening which will permit the entrance of air, at once make it large enough, and in such a position, that the air can get out again. I wish to be distinctly understood about this matter, and I want to impress it clearly on your minds, that the success of the operation depends almost entirely on keeping out the air when you puncture a joint. With this precaution there is no danger whatever connected with it. When you have punctured the joint and are about to withdraw the canula, no movement whatever of the joint must be allowed to occur until it is, so to speak, *hermetically sealed and locked*. You must have, for this purpose, some plaster of Paris, leather, or starched bandage—anything on earth, in fact, which will, when applied on the posterior aspect of the limb, promptly solidify and prevent the least movement. Let

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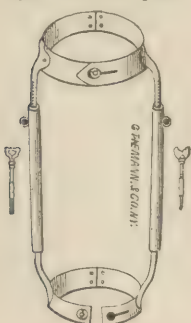
Knee Joint Apparatus.

me also impress upon you not to allow the joint to move until the external opening is perfectly united. If you do, the air will be sucked into the synovial sac, in spite of your valvular subcutaneous opening. This precaution is very simple, but is most important for the safety of the patient. If, on puncturing the joint, you find the fluid which it contains has already begun to change, has become converted into pus, then, instead of leaving it with a simple puncture, make a free incision, always cutting at the most dependent part of the sac, so that there shall be no possibility of secretions being pocketed or otherwise retained.

"As soon as it is discovered that reflex contractions are taking place, which, if not overcome, will terminate in the production of serious deformity, mechanical appliances which afford extension and counter extension must be resorted to, and are always required. Such reflex contractions will not only produce deformity, but will greatly aggravate the pain, by bringing the diseased articulating surfaces into contact. Extension and counter extension may, therefore, be necessary, for the relief of pain incident to muscular contractions. When extravasation of blood has taken place at any point beneath the articular cartilages, which can be discovered only by firm compression of the articulating surfaces of the tibia and femur in all possible directions, and also upon the patella, and especially making pressure immediately over the insertion of the coronary ligaments,—you should immediately resort to the treatment already indicated, perfect rest, and firm compression with the sponge and roller bandage or double india rubber bag, after extension and counter extension have been applied. By use of this bag the pressure on the joint is maintained evenly and there is no danger of pressing the ecchymosed surfaces of bone against each other. Pressure by this means is to be continued until absorption of the effused blood takes place and until the patient can bear concussion of the bones, the tibia and femur, against each other.

"When the disease of the joint, no matter in what particular tissue it originated, has advanced to a condition of suppurative disorganization of the structures, it is often attended with grave constitutional symptoms, such as sleeplessness, loss of appetite, great pain and irritative fever. This condition is then generally spoken of as "white swelling of the knee joint." Such a condition will require a much more systematic and prolonged course of mechanical and surgical treatment than has been indicated for the *prevention* of this advanced stage of the disease. One great indication in the case now is, to place the patient in a condition such as will permit him to have all the advantages of fresh air and sunlight, and at the same time be relieved of all irritation attending the constant attrition of the diseased articular surfaces. It is in this particular form of the disease, therefore (inflammation of the articular tissues), that extension is of the utmost importance. I regard this principle as one of such moment that, were its practical application interfered with by participation of the tissues in the inflammatory action, I should have no hesitation in cutting them, for the tendons will heal by the time the articular surfaces have resumed a healthy condition. *Extension* is especially important here, for the reason that, even when the tendons are not inflamed, the irritation produced by the inflammation within the joint invariably excites reflex action. The muscles contract and thereby increase the compression upon the already suffering tissues within the joint, and, if continued, produce serious deformities, according to the direction in which the predominating set of muscles are drawing. The result, when the diseased surfaces are left in contact, is, the pain is continuous, and the parts pressed upon undergo interstitial absorption. But, when you give *extension* to these limbs, thus locked up by disease, you will give the patient instant relief. Remember, then, in the first place, that *rest*—permanent rest of the tissues involved—is an essential part of the treatment. In addition to *rest*, *extension*, constantly and persistently employed until the patient is cured. Besides rest and extension you want *compression*; but this must be employed after the two former, for compression of the joint, without first obtaining rest and extension, would aggravate the difficulty.

FIG. 4086.
Sayre's Knee Splint.



"These indications are met by an instrument that I devised several years ago. (See Fig. 4086.) This instrument should be applied the moment there is any evidence that the disease has affected the articular structures, or reflex muscular contractions have been excited, which, if permitted to continue, will produce deformity. When the knee joint is filled with fluid, and the articular surfaces are sensitive to pressure, we should fix it in an apparatus which not only keeps it in a state of absolute rest, but is capable of so extending the parts as to remove all pressure from the articular surfaces and thus relieve pain, while it enables the patient to exercise in the open air and thus invigorates the general system, rendering absorption of the effused fluid possible without resorting to aspiration or incision. As long as there is any hope of preserving the joint, this apparatus should be employed. The instrument consists essentially, as you see (Fig. 4086), of two sheet iron bands or collars, connected by two bars so constructed that they can be made longer or shorter as required. The bands are about an inch in width, have a joint behind, and slots and a pin for fastening in front. The hinge-joint at the posterior portion of the band that is to surround the leg is

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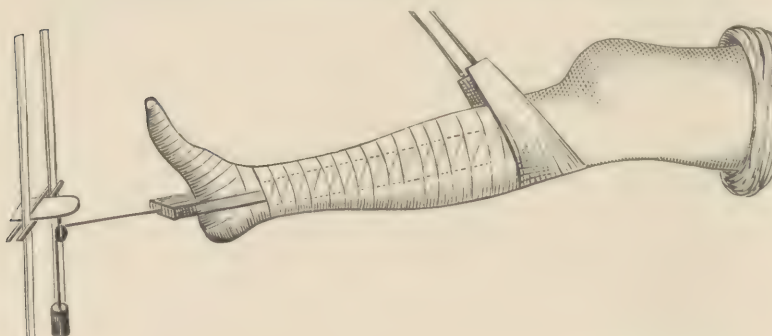
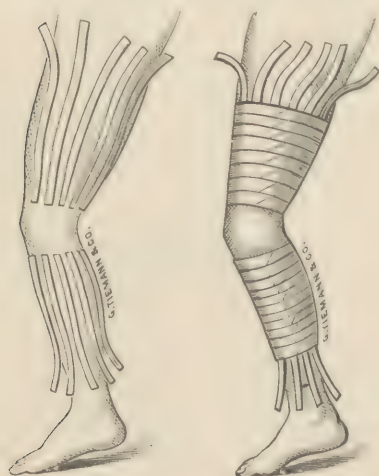
DISEASES OF THE JOINTS.

Knee Joint Apparatus.

made by cutting straight across the band and then fastening the pieces in the proper manner for forming a joint. The hinge-joint at the posterior portion of the band that is to surround the *thigh* is made by cutting out a V-shaped piece and then fastening the pieces in the proper manner for forming a joint. This V-shaped piece is removed, for the purpose of securing a smaller circle at the lower edge of the band than at the upper, which will better adapt it to the natural tapering shape of the thigh. The band which surrounds the *leg* should be immovably attached to the side bars. The band which surrounds the *thigh* should be attached to the side bars in such a manner (by a single rivet or hinge) that it can be tilted about at pleasure, which permits the use of the instrument when the leg is flexed upon the thigh at a slight angle. The bars which connect these bands or collars are divided into two pieces, one of which carries the cog and the other the ratchet, by means of which extension is to be made. The ratchet is moved by means of a key, and in this manner any amount of extension desired can be readily obtained.

"So much for the description of the instrument, and now we come to the method of its application: In the first place, if the limb is much distorted, the leg flexed upon the thigh and perhaps the tibia partially luxated backward, as

FIG. 4087.—Sayre's Double Extension of the Knee Joint.

FIG. 4088. FIG. 4089.
Sayre's Method of Securing the Plasters.

illustrated in Fig. 4087, extension must be made, while the patient is in bed, until the limb is brought to nearly a straight position, before the instrument is applied. "Such extension, previous to the application of the instrument, must be made in two directions: 1. From the foot and lower portion of the tibia, by means of weight and pulley, with the limb placed in such position that the patient can endure the extension without suffering pain; and, 2. From behind the tibia *upward* and *forward*. It is all important that such *double* extension be applied, for more than likely the direct extension from the foot will give pain until the *second* line of extension is brought to bear. This *double* extension can be applied to a limb and *continued* when the limb is placed in the proper position, so that the extending force is brought to bear without giving pain. This proper angle must be found, which can be easily done by moving the limb about, and the extension should not be made until such position has been obtained. When this has been done and the extension is properly applied, the pain is immediately relieved.

Manner of Applying Sayre's Knee Splint.

"When the double extension has brought the limb into nearly the straight position, it is ready for the instrument, which is to be applied in the following manner:

"Surround the leg with strips of adhesive plaster, about an inch in width, placed lengthwise, and reaching from the top of the tibia down to the ankle joint, and secure them with roller bandage from the top of the tibia down to the point at which the lower band of the instrument is to be applied, leaving four or five inches of the lower extremities of the plaster loose, fastening the bandages with stitches. Next, surround the *thigh* with strips of adhesive plaster of about the same width, applied in the same manner, and extending lengthwise upon the thigh from the lower extremity of the femur nearly its entire length. Secure these

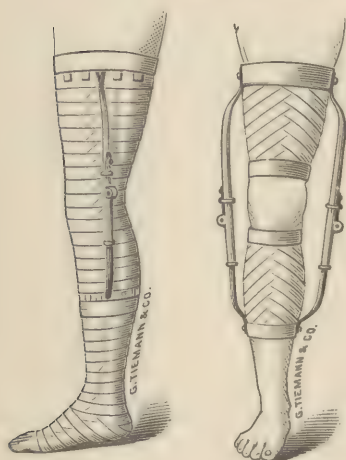
plasters with a nicely adjusted roller bandage from the knee upward to the point where the upper band of the instrument is to be applied, leaving the remaining portion of the plasters loose. (See Figs. 4088 and 4089.)

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DISEASES OF THE JOINTS.

Knee Joint Apparatus.

FIG. 4090. FIG. 4091.
Sayre's Knee Splints Applied.



"The limb is now ready for the application of the instrument. Place the instrument on the limb in such a manner as to bring the side bars upon the same plane with the condyles of the femur, and place it in the hands of an assistant, to be held steadily in that position. The collar embracing the leg should be closed, so as to snugly engage the leg, but not sufficiently tight to interfere in the least with a free return circulation. Now reverse the loose extremities of the pieces of adhesive plaster, bring them snugly over the collar and upon the leg, where they are to be secured by a few turns of the roller bandage which has just covered the foot and secured the upper portion of the plaster. Next press the lower collar down into the plasters which now engage it, and then secure the upper band about the thigh. This band, you must recollect, is attached to the side bars in such a manner, like a swivel, that it can be tilted sufficiently to come in contact with the thigh and produce serious results by pressure, unless it is properly secured. This can be done by taking one piece of plaster *behind* and another *in front*, at points exactly opposite upon the circumference of the limb and reversing them in such a manner as to bring equal traction upon the collar posteriorly and anteriorly, which will balance it so that its edges will not come in contact with the thigh at any point. The band is first closed around the thigh only sufficiently tight to be comfortable. When this is done the remaining strips of plaster can be reversed, without causing the edges of the collar to make pressure at any point, and all are then secured with a roller bandage. (See Figs. 4090 and 4091.)

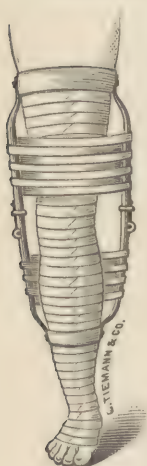
"Now we have the instrument fastened at its lower and upper extremity in a manner which will enable us to make extension and counter extension to any degree required: This is done by means of the key and ratchet on the bars of the instrument. The amount of extension and counter extension required is that which is sufficient to produce perfect relief from all pain, or the possibility of producing pain by making concussion or pressure. This can be obtained by extending the bars first on one side and then on the other, until the desired amount of extension is reached, when the instrument is locked by the slide and retained there. An important point to be remembered is, that you can do a good deal of harm by making too much tension upon the lateral ligaments. The point to be aimed at is to make just sufficient extension and counter extension to give perfect relief from all pain by pressure upon the articular surfaces of the joint, and no more. If too great tension is employed the patient will complain of a sense of discomfort. In either case, therefore, the countenance and feelings of the patient are to be your guide with reference to the amount of extension to be applied. When the dressing is first applied, the plasters and bandages may so yield that the patient, soon after their application, again suffers pain. When this happens extension is to be immediately increased, until the patient gives no response in his face upon the application of concussion or pressure. Now we have an apparatus applied to the limb which is competent to remove all pressure from the articulating surfaces of the joint.

"If there are present any evidences of inflammatory action about the joint, such as may demand active treatment by leeches, cold or hot applications, counter irritation, &c., your command of the joint is perfect and such applications can be made as may be deemed necessary. If you wish to apply hot or cold, it can be done by means of sponge and roller bandage. Just here there is an essential element in practice which must never be lost sight of; for, if we would leave the limb with the instrument applied so as to make extension, and do no more for it, it would be ruined. The boggy, infiltrated connective tissue which everywhere surrounds the joint, if left without proper support, would become more and more engorged by the bandages which have been applied, until strangulation would take place, gangrene ensue, and the knee joint and patient go together. *Compression*, then, is an essential element in the management of these cases and must never be neglected, but is never to be applied until the extension is properly adjusted. Then you must firmly strap the joint, first filling the popliteal space with cotton, old rags or sponge, and, commencing below with the adhesive strips, go upward, shingling the joint, as it were, in such a way as to leave no point uncovered. These adhesive strips must also be applied in such a manner as will make uniform pressure over the joint. You will not, however, strap the joint after this fashion until your instrument has been applied and extension and counter extension have been made; for, if applied before this has been done, the skin will be folded into pleats and strangulation and gangrene may result. Again, we wish to continue the *double* extension which has been applied to bring the limb into the present position, and this can be accomplished by carrying the bandage (after covering the knee just strapped) between the bars of the instrument and the leg, then over the bars, and under or behind the tibia, in such a way as to crowd the head of the tibia *forward*; and in the same manner above the knee, applying the bandage in front of the femur and under the bars, so as to crowd the lower extremity of the femur *backward*.

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DISEASES OF THE JOINTS.

Knee Joint Apparatus.

FIG. 4092.
Sayre's Double
Extension.

"Now, if the patient be an adult, he will probably require the aid of crutches in walking, otherwise too great a strain will be brought to bear upon the plasters which hold the instrument in place; but, if a child, he may go about without their assistance. Artificial support for these diseased knee joints (which, if properly applied, removes all pressure from the articulating surfaces and gives the patient perfect comfort; which can be worn for months, and, if need be, without changing) permits the patient to be out-of-doors, where he can obtain fresh air, the influence of sunlight, and, in short, to avail himself of all the hygienic measures which are to contribute so largely to his final recovery."—"Orthopædic Surgery and Diseases of the Joints." Second edition, 1885. Lewis A. Sayre, M. D.

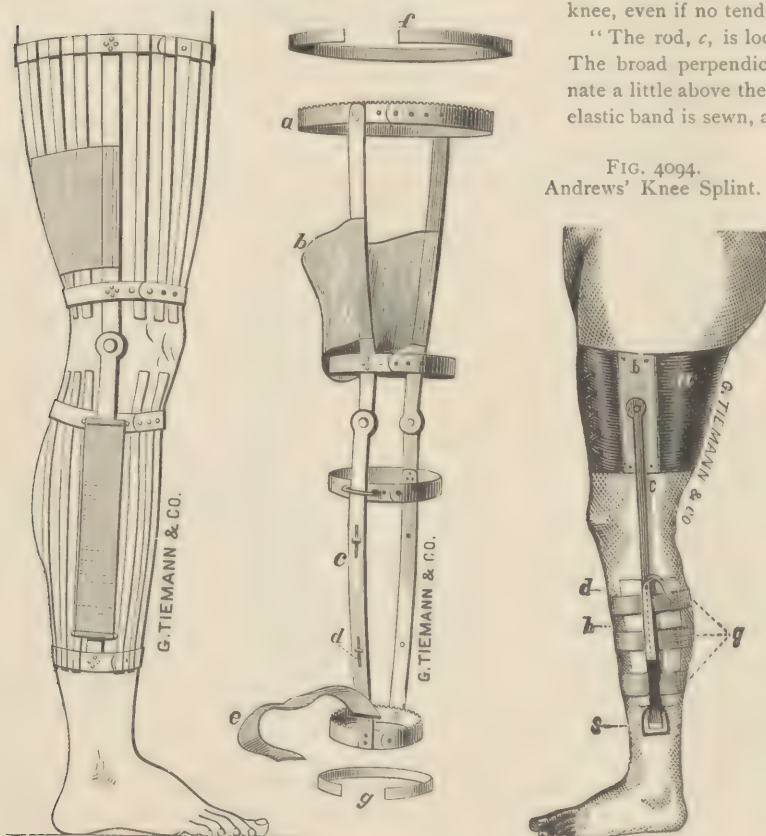
MEASUREMENTS REQUIRED:

1. Circumference of thigh, Inches.
2. Circumference of leg above ankle, "
3. Circumference of knee, "
4. Length from above ankle to upper third of thigh, "

Andrews' Knee Splint.

"If the knee can still be straightened, I apply the following apparatus. The leather lacer at the top, *a*, spreads its pressure over a wide surface, and also spreads out somewhat upon the bulge of the nates, so that hardly a perceptible pressure is exerted upon the veins at any one point; hence there is little tendency to venous congestion and swelling of the parts below, yet I think that the practice of employing a compression bandage is useful to the knee, even if no tendency to swelling exists.

"The rod, *c*, is loosely jointed to the steel plate, *b*. The broad perpendicular adhesive strap should terminate a little above the slot, *s*. To the lower end a stout elastic band is sewn, a few inches long. A leather strap is sewn to the elastic.

FIG. 4094.
Andrews' Knee Splint.

"The opposite side of the limb is armed in the same way. The hip leather being laced on, the strap and elastic bands carried down to the slot, *s*. The strap is drawn through the slot, then stretched firmly upward by the hand and buckled to the knob, *d*. The elastic, in passing under the friction roller, pulls strongly downward on the adhesive plaster and the limb to which it is attached.

"Elastic bands are not strictly necessary; but the elastic is convenient, because in any yielding or stretching of the dressings its contractibility still keeps up the tension, without requiring so much watchfulness on the part of the surgeon. If it is desired to remove the apparatus, all that is necessary is to unbutton the two straps, when the brace can be slipped off over the foot."—E. ANDREWS, M. D.

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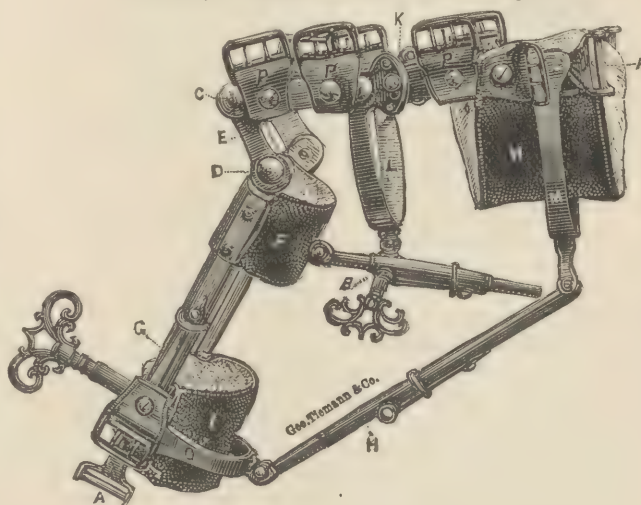
Knee Joint Apparatus.

FIG. 4095.
Hutchison's
Knee Joint Splint.



"To secure *fixation* of the knee-joint, I use splints made of hatters' felt. It consists of seven layers of cotton cloth, saturated with shellac and well rolled together while hot. That ordinarily sold consists of but five layers of cloth, which, for most cases, is not firm enough. To give effectual rest to the joint, the splint should be of sufficient length and wide enough to nearly surround the limb; it should extend half way up the thigh, and to a corresponding point below the knee. A shorter splint, merely wide enough to cover the posterior part of the limb, does not secure the complete immobility which I have insisted upon in the treatment of diseases of the joints, where absolute rest is demanded. The splint having been cut of the proper length and width with a sharp knife, and the limb covered with a stocking, the felt, made pliable by dry heat in an oven or before an open fire, or by immersion in very hot water, is applied to the limb and covered quickly and firmly with a bandage from below upwards, so as to mould it to all the inequalities of the surface. While the splint is being applied, an assistant should make extension from the foot, so as to straighten the limb as much as possible, in cases where the joint is flexed; but no violent effort should be made to reduce the malposition. So soon as the splint regains its inflexibility it may be removed, trimmed up and holes punched an inch or an inch and a half from the front edges for lacings. The object in punching the holes a little way back from the edges is to permit the splint to be made smaller by cutting off the edges, so that pressure may be kept up as the knee diminishes in size. The weight of the body is removed from the diseased joint by the use of the elevated shoe and crutches (see Fig. 4072)."—HUTCHISON.

FIG. 4096.—Shaffer's Knee Extension Splint.



In the *Archives of Clinical Surgery*, for June 15th, 1877, Dr. Newton M. Shaffer remarks: "I have attempted to meet the pathological indications presented in knee-joint lesions with an apparatus which I devised some time ago. Its design is to apply the desired force directly to the head of the tibia, throwing the same forward and downward by a simple movement. While we thus overcome the muscular contraction *in a direct line*, we relieve the joint pressure and overcome the deformity simultaneously. The apparatus is represented in the accompanying engraving.

"It consists of three principal parts: the thigh, leg and intermediate. The first two are secured to the limb by adhesive plasters, which are attached at the points, *A, A*. Extension is made with a key at the extension rod proper, at *B*. The joints, at *C* and *D*, move upon pivots, and as the extremities of the apparatus are secured by their adhesive straps at *A, A*, the joint, *D*, moves forward and downward, describing the arc of a circle, the radius of which is the bar, *E*. Pressure is thus made directly upon the head of the tibia by the band, *F*, and this can be very greatly augmented by using the extension rod at *G*, which further relieves the joint of pressure by additional extension in the position already acquired by the preliminary extension of the rod, *B*. *H* is an accommodation—not properly an extension rod—which glides forwards as the extension is applied at *B*. As soon as the leg is thrown sufficiently forward, the accommodation rod is secured by a slide, and an extra turn of the key at *B* and *G* leaves the joint free from pressure, and with adequate extension applied directly to the contracted flexors. The thigh and leg bands at *H* and *I* move upon pivots, so that they adjust themselves readily to any position, and at *K* there is an arrangement by which the curved bar, *L*, may be adjusted to suit the requirements of the extension rod, *B*. The bars, *M* and *O*, are secured to the thigh and leg parts by double rivets. Through the buckles, at *P, P, P*, webbing straps (padded) are passed, producing counter extension in addition to that secured by means of the adhesive straps."

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DISEASES OF THE JOINTS.

Knee Joint Apparatus.

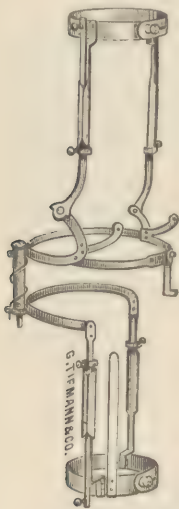
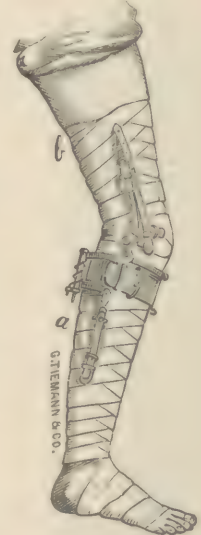
FIG. 4097.
Roberts' Knee Splint,
with Tibial Rotation.

FIG. 4098.—Elastic Tension.

FIG. 4099.
Roberts' Knee Splint,
applied.

"The force which keeps up traction, subdues reflex muscular spasm, and overcomes the deformity is *elastic tension*, and in this instrument is developed by means of a spiral spring and rubber straps. The instrument permits walking and riding without inconvenience or discomfort, and hence deriving all the benefits of fresh air, sunshine, and a sufficiency of exercise. During locomotion, limited movement of the joint takes place, and hence approaches the condition obtained in the healthy knee. The circulation of blood through the limb is facilitated and the maximum amount of nutrition is furnished the joint for the purpose of carrying on the repair of the diseased tissues.

"The extension is effected by means of two steel bars; one is provided with expanded margins, turned over so as to form a groove, in which the other slides. The outside bar is attached by one extremity to the metallic band which encircles the limb, and the extremity of the bar, which slides within the groove, enters into the formation of the joint.

"In order to make elastic extension, a narrow strip of strong elastic webbing is made fast to the loop of the inside bar. A buckle is attached to the button at the opposing end of the other bar. By means of this buckle and strap any desired amount of elastic force can be exerted.

"In applying the instrument, the upper and lower metallic bands to encircle the limb are secured in position, in the usual way, by strips of strong adhesive plaster and roller bandages. A flat strip of steel is attached to the lower metallic band and projects upward so as to rest upon the belly of the *tibialis anticus* muscle. This strip is encased with adhesive plaster, with the adhesive side out. A roller bandage is carried over it, and thus additional leverage and fixation of the instrument to the limb is secured. From the lateral bars of the splint projects a semi-circular piece directly in front of the head of the tibia. An adjustable metallic arm, attached to the middle of this semi-circular piece, projects downward in a line with the spine of the tibia. This arm is at a little distance from the front of the leg and serves as a fixed point to which a broad elastic web band is attached, that passes around the leg behind the head of the tibia. By means of the buckle any desired tension upon the posterior part of the head of tibia can be exerted. The metallic arm is adjustable upon the semi-circular piece, and hence the direction of the *elastic tension force*, applied by means of the webbing to the posterior aspect of the head of the tibia, can be forward, or forward and inward, as the necessities of the particular case require. An elastic knee-cap and broad strip of webbing serve to keep the upper segment of the instrument in the same relative position to the thigh. From the lateral shaft of the brace on each side and below the joint projects directly forward a metallic lever, curved upward. To the ends of this lever are attached strong strips of elastic webbing, which pass up to the upper or unattached ends of the bar, and are designed to supplement the functions of the quadriceps extensor muscle. Finally, by means of a spiral spring, you can, with a key applied to the lower or projecting end of the pivot, secure the continuance of any desired amount of *elastic force* tending to rotate the tibia inward on its long axis, and thus, in conjunction with the elastic band which passes behind the head of the tibia, overcomes the subluxation and rotation outward of the head of the tibia.

"Whenever a case of chronic disease of the knee joint comes under treatment, before subluxation and rotation outward of the head of the tibia has occurred, the tibial rotating mechanism is dispensed with, and a simpler instrument fulfils all the therapeutic indications. This is represented in Fig. 4100. The lower and upper ends terminate in bands about the leg, and the side-bars are constructed, as previously described, for making *continuous elastic traction*. It is applied to the limb in the same manner as Dr. Sayre's knee-splint, by means of strips of strong adhesive plaster and roller bandages."—From a paper read before the Medical Society of the County of New York, January 23, 1882, entitled "Elastic Tension and Articular Motion as Therapeutic Agents in the Mechanical Treatment of Chronic Inflammations of Joints," by Dr. M. Josiah Roberts.

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Knee Joint Apparatus.

FIG. 4100.—Roberts' Plain Knee Splint.

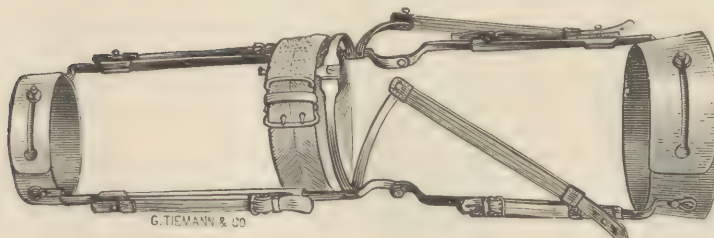
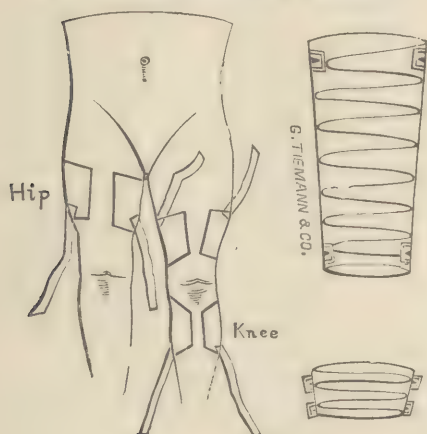


FIG. 4101.
Holthouse's Spiral Spring Extender.



The apparatus consists of a spiral spring, covered with leather, flannel or linen, and having two buckles at one or both extremities. When extended, it forms a cylinder closed at the sides but open at each end; and when the coils of the spring are pressed together it approaches in form to a discoid ring or closed concertina—it need not, however, necessarily be cylindrical, but larger at one end than the other in conformity with the tapering shape of the limb. It is applied with adhesive plasters, to which tabs are attached for the buckles.

FIG. 4102.—Stillman's Bracket and Sector.

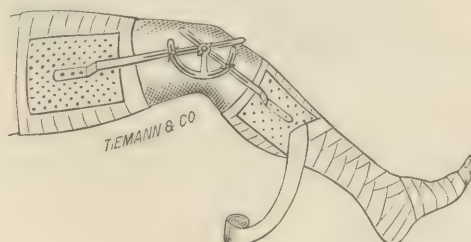
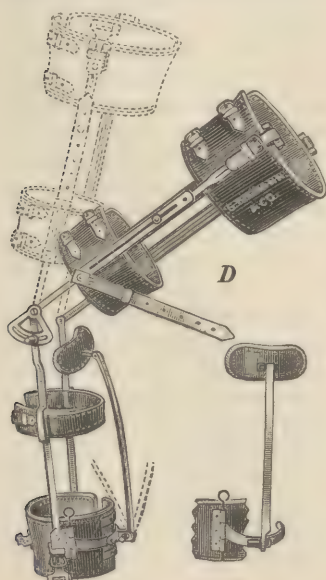


FIG. 4103.
Stillman's Knee Extension Brace.



"The bracket is composed of plates of copper, connected to a compound slotted bridge. The plates are so punched that the edges of the perforations will be elevated above the surrounding surface, and thus cause them to be held firmly in place by the plastered bandage. A steel slotted sector is attached to the bridge, either before or after the bracket has been secured upon the limb, as the case may demand. This splint is simple in construction, and its principle is as readily applied to the elbow, hip and intervertebral articulation as to the knee.

Stillman's Knee Extension Brace.

"In chronic conditions of the knee joint, however, the plaster of Paris attachment is always uncomfortable, and can not be removed without disturbance of the joint. Since the atrophic changes in the soft parts about the joint render frequent removal of the dressing desirable, it becomes almost a necessity to provide special forms of apparatus which can be removed whenever necessary. In Fig. 4103 such an one is shown. By means of a clamp in the slotted arc the joint may be fixed in any desired position, or, by releasing the clamp slightly, motion may be allowed.

"An important indication is the employment of traction. To effect this four plasters are cut, fan-shape, as shown in Fig. 4104, *A*, and a long strip of webbing is attached to each.

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Knee Joint Apparatus.

FIG. 4104.
Application of the Plasters to Effect Traction.

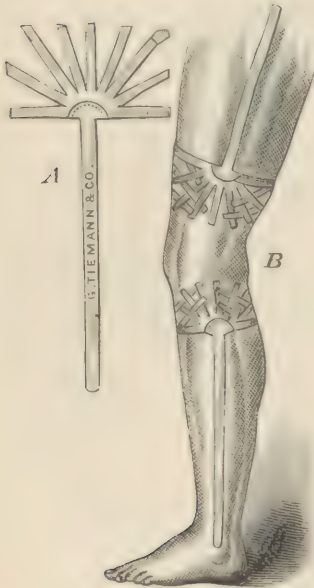
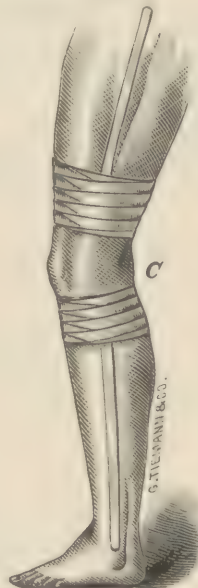


FIG. 4105.
Traction.



"These plasters are placed as shown in Fig. 4104, *B*, interlaced for greater security from displacement, and then covered with roller-bandage, as shown in Fig. 4105. The inferior and superior extremities of the splint are provided with rollers and buckles to which the webbings are to be attached. By means of an *elastic ratchet*, Fig. 4103, *D*, force may be applied upon the thigh portion of the instrument to effect *elastic extension*. This ratchet consists of two over-riding slotted strips, which can be fastened together by a screw-clamp if the surgeon prefers rigid extension.

"Another indication is the prevention of posterior luxation. To meet this I have devised a spring lever power which operates without interfering with the action of the remainder of the brace. It is a long, flat steel bar, bent to conform to the back of the leg, and placed posteriorly. At its upper end is attached a semi-girth, which presses on the back of the upper part of the leg, and below it is attached to a stirrup which is itself fastened to the lower girth of the instrument. This stirrup is provided with a hinge and socket, so that it may be opened and shut when the brace is in position. The forward pressure of the lever can then be adjusted by means of a ratchet at the intersection of it with the stirrup. *Extension* of the joint is effected without pain to the patient.

"After traction has accomplished its purpose and extension is no longer necessary, the splint is so arranged as to permit the removal of the rollers and buckles at each extremity and of the traction ratchets—thus converting it into a simple fixation splint or knee support during the stage of convalescence, when, by the use of restorative measures, the anterior muscles of the thigh have been strengthened so as to hold the tibia forward in its proper axis with the femur.

FIG. 4106.—Stillman's Knee Splint, applied.

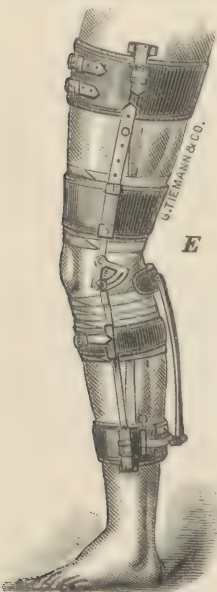
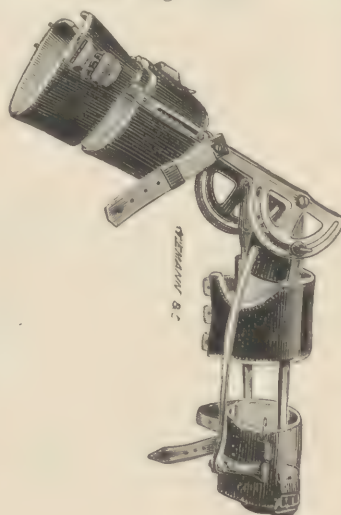


FIG. 4107.—Stillman's Knee Splint, with large Sectors.



"Fig. 4107 shows a brace which differs from the one just described only in the greater lateral support afforded the knee by the use of two *larger* sector movements opposite the joint. There is also frequent occasion to force the sides of the brace as closely against the joint as possible, in order to afford protection from lateral displacement; this is effected by a metallic band spanning the knee anteriorly, which must be raised sufficiently not to touch the surface.

"So far the braces shown are used in connection with crutches and a raised shoe; but in convalescence, when the weight of the body can be borne without pain, and yet protection of the joint is desired, the side-strips of the brace are frequently jointed at the ankle and extended below the foot, being attached to the shoe underneath the arch by a pivot, to allow of the natural movements of the foot."—Charles F. Stillman, M. D., in *New York Medical Journal*, January 8th, 1887.

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DISEASES OF THE JOINTS.

Ankle Joint.

"Anatomy.—The bones which enter into the formation of the ankle joint are the lower extremity of the tibia with its malleolus, the lower extremity of the fibula, or the external malleolus, and the upper convex surface of the astragalus. These articular surfaces, covered with cartilage, are held in place by the internal and external ligaments and the anterior ligament of the ankle joint, which are lined with synovial membrane. The important thing to be remembered with reference to this joint is, that it is simply a hinge joint, has a to-and-fro movement, and *no other*. The articulation between the astragalus, the lower extremity of the tibia, and the two malleoli, is so complete, close, and perfect, that it will admit of no lateral movement whatever. This is one of the statements which I make with positiveness. The apparent lateral motion which takes place is not at the astragalo-tibial articulation, but below, at the articulation of the astragalus with the os calcis. When the toes are turned out or in, it is in obedience to rotation of the leg and thigh at the hip joint; or, if the leg is flexed upon the thigh by the action of the biceps and tensor vaginæ femoris, giving a revolving motion to the head of the fibula.

"Pathology.—All lateral movements made at the ankle joint are done at the expense of an injury to the structures of that joint; for no lateral movement, external or internal, abduction or adduction, can take place without producing undue pressure against the synovial membrane and articular cartilages or the basement membrane beneath them. These articular cartilages, like those in other joints, are elastic, non-vascular, and receive their nutriment by imbibition from the synovial membrane and from the vessels of the articular lamella. Necrosis of these cartilages takes place with the greatest rapidity on account of the low degree of vitality they possess; hence they are the source of great danger when, in any manner, the tissues beneath them become so disturbed as to interfere in the least with their nutrition. I do not believe, however, that disease ever commences in the cartilage itself. The malleoli, which stand as guards on the side of the joint, are not so well protected, because in the normal movements of the foot they are not subject to much pressure and consequently the cartilage covering them is not so thick as that covering the top of the astragalus or bottom of the tibia. You have probably all, at some time, twisted your ankle in walking, and you cannot have failed to notice how instantly the malposition of the joint is followed by a spasm of the muscles of the leg.

"We may have diseases of the ankle joint which commence either in the ligaments or in the synovial membrane, or, which I believe to be far the most frequent, in the articular lamella immediately beneath the articular cartilage. In a great majority of instances what we have to deal with is an extravasation of blood beneath the synovial membrane, or between the cartilage and bone, quite analogous to the 'blood blister' which is formed upon the external surface whenever the skin is severely pinched but not broken. This may occur either upon the astragalus, or at the lower extremity of the tibia, or, still more commonly, as the result of pressure produced by the astragalus against the inner surfaces of the malleoli, which are not sufficiently protected to resist their pressure. Under such circumstances no swelling occurs that can be seen; there is pain, probably, but the cases are very liable to be neglected, their importance overlooked and thus a slight injury, producing only trifling damage at first, may be permitted to go on and develop the most serious condition, ending in inflammation, which goes to softening of the bone, necrosis of the cartilages, and destruction of all the tissues involved in the joint. The inflammation may extend to other bones and you may have, as a result, softening and caries of all the bones of the tarsus.

*"These are the cases that are called 'scrofulous disease of the ankle joint.' There is no scrofula about it in the vast majority of cases. It is simply inflammatory softening, ending in caries and necrosis of the bones, and ulcerative destruction of other tissues entering into the formation of the joint; and instead of being constitutional in its origin, dependent upon a constitutional cachexia, it is simply inflammation of the joint dependent upon injury, consequently *traumatic* in its origin. When children who have scrofulous diathesis receive an injury sufficient to lead to serious results, such results are usually more rapidly developed and less amenable to treatment than when the injury occurs to previously healthy children, or children born of healthy parents.*

"Symptoms.—With this view of the subject you can at once see the very great importance of early recognition of the exact nature of these trifling injuries to the structures of the joint, which may lead, if neglected, to such serious results. To this end, therefore, I shall endeavor to point out to you in the plainest manner possible the symptoms by which you will be able to recognize them in their very earliest stages, so that you may be able to adopt a plan of treatment which will *prevent* such unfavorable results. First, then, if the twist, wrench, sprain or bruise, which the patient has received, has produced an injury that involves the synovial membrane chiefly, it will be followed very speedily by increased effusion within the joint, giving to the joint a peculiar fullness in front of either malleolus, within which swelling an indistinct fluctuation can be recognized. This, in a few hours, is followed by great heat and intense pain; a sense of tension, accompanied by throbbing and great tenderness and pain, will be present when the articulating surfaces are crowded together and slightly twisted upon each other. If, on the other hand, the ligaments are involved more than the synovial membrane, the injury will not be attended with so much swelling as when the synovial membrane alone is involved; and the tenderness and pain are not produced by pressing the articular sur-

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Ankle Joint.

faces together, but, on the contrary, are relieved, and it is by making extension and rotation, together with pressure upon the ligaments over their points of attachment, that pain is produced and tenderness detected. If, however, the injury is the result of a blow or concussion, with or without much twisting, but received in such a manner as to produce rupture of the bloodvessels underneath the articular cartilage, in the articular lamella, either at the top of the astragalus, base of the tibia, or inner surfaces of the malleoli, then there will be but slight pain at first, but afterward the suffering will be altogether out of proportion to the appearances presented. At first the extravasation of blood into the bone is very light, and, being in a tissue which cannot swell, no apparent enlargement takes place; nor is discoloration observed, because the extravasation is so deep-seated. The ligaments not being specially involved, making them tense does not produce pain. All these facts add to the deception and make us very liable to pass over the case as one of trifling importance.

"When this accident has occurred the only manner in which it can be recognized is by direct pressure upon the part affected by the extravasation. The seat of the injury may be at any point on the surfaces of the joint, and it therefore becomes necessary to make pressure upon all parts of the joint, by moving the bones in every direction and also making lateral pressure so as to bring it to bear upon the sides of the malleoli. We are not safe in giving a diagnosis in these cases, until in this manner we have thoroughly explored every portion of the joint. The important thing to recollect and always to keep in mind, when called to examine and treat this class of cases, is, that serious injuries of joints compel attention and that slight ones are often neglected, and, generally speaking, the slighter the accident the more apt to be neglected; but these are the very ones which are exceedingly dangerous.

"If an injury be severe, for example, a fracture involving a joint, a dislocation, or even a severe sprain, it cannot be overlooked or neglected; surgical aid is indispensable and is immediately called for, and generally a cure results after a reasonable time. When, however, a person receives what is termed 'a slight sprain of the ankle,' the amount of mischief from a neglect in recognizing what structures are involved, and instituting a proper method of treatment, is often extreme, and may terminate in a sacrifice of the limb as the only remedy for a chronic inflammation of the joint involved. Let us, then, next consider how such disastrous results may be brought about. We will take, for example, a simple sprain of the ankle, which is very common, and from which all of you, it may be, have suffered. As I have already told you, a 'blood blister,' or extravasation, is first produced. Such a 'blood blister' is considered as insignificant under ordinary circumstances, if it be allowed immediately to heal. If, however, the 'blood blister' is constantly irritated by friction an ulcer is formed, which rapidly increases in size and involves the deeper tissues.

"This, I believe, is exactly the morbid process going on in one of these neglected sprained ankles. The small quantity of blood effused behind the synovial membrane, or between the cartilage and bone, would be speedily absorbed if sufficient rest were allowed to the part; but there is no swelling, and little pain, it may be, to give warning of the mischief done and the patient does not stop his usual walks and exercise. The 'blood blister' becomes irritated and increases in size, and finally, on account of the disturbance produced, he is obliged to lay by for a short time. The trouble apparently disappears and he resumes his avocations; a slight over-exertion, however, brings back the same train of symptoms—namely, exhaustion, stiffness, pain, tenderness, and perhaps swelling. This is repeated again and again, as often as rest allays and exertion awakes the morbid process, the attacks becoming more and more severe and prolonged, till at last the condition of chronic inflammation is reached. The liquid now contained in the joint is abnormally abundant and is changed in consistency; instead of the clear synovia there is an opaque, viscid substance. To this, in part at least, is due that peculiar distention and 'boggy' feel which the joint now presents. Ordinarily, suppuration very rapidly supervenes upon this condition of the articulation. The cartilages become necrotic and caries of the adjacent surfaces of the bones is set up. The pain now is often excruciating, as is generally the case when cartilage is undergoing disintegration. As a result of this process the constitutional disturbance is usually quite severe and the pain produces sleeplessness and loss of appetite. The muscles affecting the articulation are constantly 'on guard' to fix the joint and prevent any rubbing together of its surfaces.

"Such constant tension causes an atrophy of the limb both above and below the joint; though in the latter situation it may be obscured by swelling. At night, when sleep has become so sound that the muscles relax their tonic contraction, motion will take place in the joint and the patient awakes with a sudden, piercing shriek. So quickly do the muscles resume their conservative contraction, that, by the time the nurse has reached the bedside, the patient is again asleep or is unconscious of the cause of his awakening. This pressure of the joint surfaces, although painful, is less so than the motion which would occur if the muscles were not thus contracted; but it very much increases the destruction of the cartilage and bone, and you will find, in *post mortem* examination of the parts, erosion of the tissues farthest advanced at those points where the pressure from muscular contraction has been greatest. When the joint is thus filled with a liquid which is causing disturbance as a foreign body, one of two terminations is necessary,

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the absorption, or evacuation, of the liquid. If there is a probability that absorption of the fluid can take place, it is best promoted by fixing the joint in such a manner as will relieve the pain and defend it from attrition of the articular surfaces, thus allowing our attempts to renovate and invigorate the system really to take effect.

"If, in addition, we apply some apparatus which will permit the patient to take out-of-door exercise without disturbing the *rest* so essential to the articulation, we shall have done the best thing possible, and, fortunately, our effort will often be crowned with success. If, however, such precautions are not employed, and often indeed, in spite of them, the disease proceeds to ulceration of the bone, and now, if we do not make an exit for the pus, it will eventually make one for itself. In the meantime, however, long and tortuous sinuses will have formed, the pus burrowing this way and that among the muscles and between fasciæ, so that these tissues are involved, while by long-continued action of the pus the disease of the bones becomes greatly extended. Much of this trouble is avoided by opening the joint when we are convinced that any considerable amount of pus is contained within its cavity. When the disease has advanced to this stage, the case is looked upon by the mass of the profession as an unmistakable illustration of 'scrofulous disease of the joint,' but I believe it to be the result of inflammatory process dependent upon a traumatic cause.

"*Treatment.*—In all sprains or bruises affecting the ankle joint, involving the ligaments or producing effusion of blood, the very best treatment that can be adopted is to immediately immerse the limb in water of as high a temperature as can be possibly borne, gradually increasing this temperature until the heat is carried up to the highest point the patient can tolerate, and then maintain this for a varying length of time, perhaps several hours, until all pain upon pressure and slight movement has entirely subsided. * * * When the pain is relieved by the foot-bath, the patient should be placed in an horizontal position, with the limb elevated and firmly bandaged with a flannel roller from the toes to the knee and then kept wet, or dry, as may be more agreeable to the feelings of the patient. Perfect rest of the limb in the elevated position, with this even compression, is to be maintained until all tenderness upon firm pressure has completely subsided and until the limb can be held in the dependent position without producing any unpleasant symptoms. If the *synovial membrane* has been involved in the injury and effusion and over-distension of the joint have ensued, *elastic compression* is the essential element in the treatment. This can be obtained by surrounding the joint with a large sponge. The sponge should first be thoroughly saturated with warm water, then made as dry as possible by squeezing with the hand and finally made to completely surround the joint, being particular to have it quite thick over the instep and both malleoli. After it has been properly applied around the joint, bind it firmly in place with a bandage that will permit water to pass through its meshes. This bandage should include the foot, ankle and leg, and, after the sponge has thus been compressed by the bandage, both sponge and bandage should be thoroughly soaked with water; the sponge, absorbing the water, will increase in size, and, as the bandage prevents it from expanding outward, the pressure induced by its enlargement is done at the expense of additional pressure of the parts enveloped by the sponge. This method of making elastic pressure is within the reach of every surgeon.

"A more convenient method of making even pressure over the joint is by means of a double india rubber bag, manufactured by Tiemann & Co., of this city. It is simply an india rubber sac with double walls, which encloses the ankle and foot; a tube connects with this hollow bag, which can have warm water poured into it, and then the bag is to be blown up, either by the mouth or a pair of bellows, and a stopcock turned which retains the air. (See Fig. 4108.) In this manner pressure can be made which will be exceedingly powerful and yet so soft and elastic as to be easily borne. Such pressure, constantly applied, on account of its elastic character, will cause an absorption of the fluids within the joint; and also, by this very pressure, we have a tendency to separate the articulating surfaces from being forced upon each other by muscular contractions.

DIRECTIONS FOR MEASUREMENT:

1. Circumference of instep, Inches.
2. Circumference of ankle, "
3. Circumference above ankle, "

"*Massage.*—After a few days have elapsed, friction with the hand is of the greatest possible advantage; but, to afford the best result, it should be much more briskly applied, and continued for a much longer time, than has generally been done by the majority of surgeons. In fact, many cases of quite severe injury affecting the ankle joint, or

FIG. 4108.
Sayre's Rubber Ankle Compressor.



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any other joint, such as a wrench or a sprain, will yield, in a comparatively short time, to manipulation and friction persistently applied for some few hours every day. I have employed this plan of treatment for many years and long before the term 'massage' was applied to it. It is, however, sometimes necessary that a method of treatment should go across the water and be baptized with a new name before it becomes popular.

"So much for the treatment to be adopted when the injury is first received. This is the important time for the application of measures which are to prevent further development of the disease, and, could such treatment be faithfully carried out in every case from its earliest commencement, there would rarely be need of mechanical appliances and surgical interference. Unfortunately, however, very many cases pass unrecognized, or, being recognized, are neglected, and gradually arrive at a stage in which surgical aid is sought and then they probably are in a condition which will demand some more formidable method of treatment than that which has already been given. When there is still hope of preserving the joint intact, which is to be determined by the length of time the condition has existed, the amount and character of the fluid in the joint, the degree of constitutional disturbance, and the general condition of the joint, I employ an instrument which I have devised for this purpose.

"This instrument consists of a firm steel plate, made to fit the sole of the foot; at the heel is a hinge joint and attached to it a rod, slightly curved at the bottom and extending up the back of the leg to near the knee. Over the instep is an arch like the top of a stirrup, with a hinge joint at its summit from which springs another rod, which runs in front of the leg, of equal length with the one behind. These rods are made with a male and female screw or ratchet and cog, for extension, and connected at the top by a firm band of sheet iron, on one side of which is a hinge and a lock on the other, like a dog collar. In front of the arch that goes over the instep is a joint in the foot plate which permits flexion of the toes.

"The instrument is applied with firm adhesive plaster, cut in strips about one inch in width, and long enough to reach from the ankle to a short distance above the knee and placed all around the limb, as seen in Fig. 4110. The plaster is secured in its position to within a few inches of its upper extremity by a well adjusted roller, as seen in Fig. 4111. To prevent its slipping, the ends of the plaster at the top of the instrument are turned over the collar, which has been previously locked, just tight enough to be comfortable, and secured by a turn or two of the bandage, as seen in Fig. 4111. With the instrument accurately adjusted, the extension can be regulated by the key, so as to make the patient comfortable.

"If, however, the symptoms show the system to be suffering from the poison of the pus retained in the joint; or if, the joint being open, the patient is sinking under the drain of prolonged suppuration, the diseased bone should at once be removed and a perfect drainage established, so that no pockets or sinuses can be formed. If this latter accident be allowed to occur, the disease of the bone will not be arrested and the operation will therefore be useless. Now, you cannot in the ankle excise the bone, as you can at the shoulder or hip, by a straight incision. In these orbicular joints the operation is simple: you have but to cut down to the bone, open the capsule, throw out the head of the bone through the 'buttonhole' slit, remove it with the chain saw, and finish with the rongeur or forceps, if necessary. But in the hinge joints, as a rule, and especially such complicated ones as the ankle, you cannot safely operate in this way."—See description of operation, "Orthopædic Surgery and Diseases of the Joints." Second edition, page 175. Lewis A. Sayre.

"The joint being opened, all of the granulation tissue and carious bone should be carefully removed with scissors or scoop, carious cavities scooped out; all recesses where there is diseased tissue should be cleaned and well irrigated. Insert drainage tubes into deep cavities and close the wound, or pack it with strips of iodoform gauze and cover with iodoform pad and sublimate gauze bandage; over this place a layer of borated cotton and finally apply three layers of gypsum bandage; cut openings opposite the drains and suspend the limb."—"Operative Surgery." Stephen Smith.

FIG. 4109.—Sayre's Ankle Joint Splint.

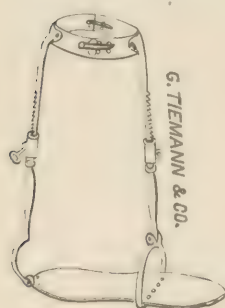
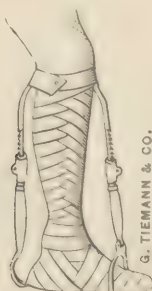


FIG. 4110.

Application of Sayre's Ankle Plasters and Splints.



FIG. 4111.



MEASUREMENTS REQUIRED:

1. Trace the outlines of the sole on a piece of paper.
2. Length from sole to garter, . . . Inches.
3. Circumference at garter, . . . "

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DISEASES OF THE JOINTS.

Ankle Joint Apparatus.

FIG. 4112.
Hutchison's Ankle Joint Splint.

"In the treatment of inflammation of the ankle joint and its consequences, *perfect rest* of the parts (mechanical immobilization), and the *removal of pressure* from the diseased articular surfaces, is quite as important, and, I may add, quite as satisfactory, as in the diseases of the hip and knee, and the indications may be met in the same way. Instead of the felt, I prefer to use, for fixing the ankle, two splints made of plaster of Paris, because they adapt themselves better to the inequalities of the surface about this joint; one is to be applied in front and the other behind, extending from the middle of the leg to the ends of the metatarsal bones, and wide enough to leave an interval of half an inch between the edges on the inner and outer side. The splint should be made of two thicknesses of canton flannel, with coarse meshes, or three thicknesses of coarse toweling, cut of the proper length and width. One layer of cloth is laid upon a table and covered with liquid plaster, of the consistence of cream, and spread smoothly with a table knife. The other layers are then immersed in the plaster and applied evenly and smoothly over the first; and, when both splints have been prepared, one is applied in front and the other behind, with the under surface of the first layer, which is not covered with plaster, next to the skin, and a roller bandage is firmly applied over the splints from below upwards. The surgeon should now grasp the foot, and, holding it at a right angle to the leg, make extension until the plaster hardens, which requires about five minutes. The bandage should then be removed, and the splints surrounded by three or four strips of adhesive plaster, and the bandage re-applied more loosely.

Windows may be cut in the plaster, so as to allow any openings that may exist in the parts to be uncovered. I have no hesitation in recommending the elevated shoe and crutches (Fig. 4072) as the best and simplest method of making extension and removing pressure; it is just as effectual for the ankle as it is for the knee and hip joints. The weight required is not great, and the weight of the foot is sufficient to overcome the muscular contraction."—Proceedings of the Medical Society of the County of Kings, April, 1879. J. C. Hutchison, M.D.

FIG. 4113.—Andrew's
Apparatus for Inflamed
Ankle Joint.

"For some years I have used with the greatest satisfaction and excellent results the following simple device. The cut gives a correct idea of it.

"The top of the foot and the lower half of the leg constitute two cones, whose apices meet at the ankle. Now if any moderately firm and well-fitting material surround these parts, and be laced together with some firmness, the two cones will be pressed apart and extension of the ankle secured; or, to put it in different terms, the inverted cone laced to the leg is a counter-extending force, while the lacing together of the hollow cone embracing the upper surfaces of the foot tend to push that member downward, and thus makes extension upon the joint. To construct this, a plaster cast should be taken of the foot and leg, with the foot hanging free and pointing somewhat downward. This position is found by experience to be much the best. A piece of wet russet harness leather is wrapped around the cast and crimped to a perfect fit by winding a stout cord or a piece of webbing all over it. The leather laps over itself in front. After a few hours drying in an oven, or on a stove, the leather hardens and retains its shape. Before applying the leather, a little building out of the malleoli of the cast should be done with plaster of Paris, that the leather may be well moulded out, and not press painfully on those prominences. Eyelets are set in the overlapping edge, and in a strip of leather sewed to the part opposite it, so as to allow of lacing it up to any

desired tightness. The eyeletted edges of the leather should be wider apart on the dorsum of the foot than elsewhere, as, owing to the yielding part of that member, the edges lace together more than on the leg. The brace is finished by pasting in a chamois leather lining. It fits the limb like wax, keeps up a gentle and desirable pressure on the joint, maintains immobility and pushes down the foot, so as to make an effective extension of the ankle joint. No screws, racks and pinions, nor even adhesive straps are required. The action of the instrument has pleased me beyond measure by its simplicity, the ease with which it can be taken off and re-applied, and its efficiency in curing the inflammation.

"The same principle can be temporarily carried out by means of a dextrine splint, open behind, and compressed by an elastic bandage, or even by a common roller."—E. ANDREWS, M. D.

ORTHOPÆDIE.

DISEASES OF THE JOINTS.

Ankle Joint Apparatus.

FIG. 4114.
Stillman's Ankle Splint.

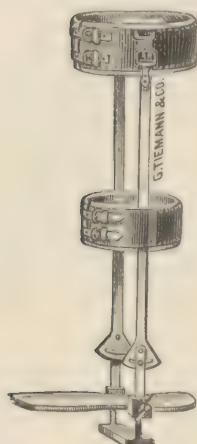
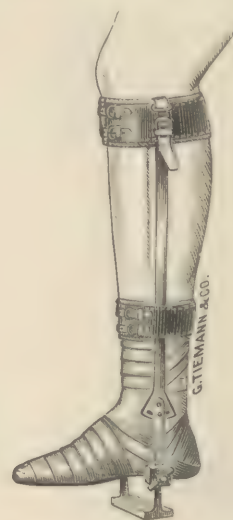


FIG. 4115.
Application of Plasters.



FIG. 4116.
Stillman's Ankle Splint Applied.



MEASUREMENTS REQUIRED:

- | | |
|--|---------|
| 1. Trace the outlines of the sole on a piece of paper, and mail to us with | |
| 2. Length from sole to ankle, | Inches. |
| 3. Length from sole to calf, | " |
| 4. Circumference of calf, | " |

Shoulder Joint Apparatus.

Stillman's Cable Splint.

FIG. 4117.

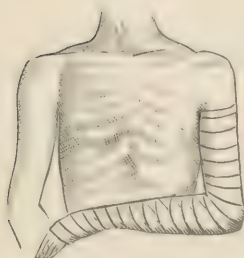


FIG. 4118.

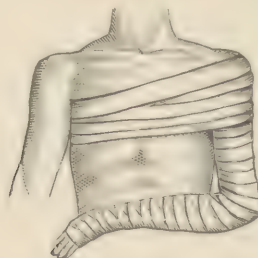


FIG. 4119

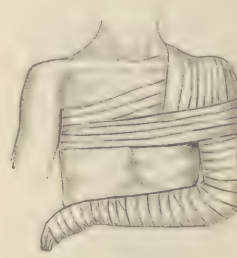


FIG. 4120.

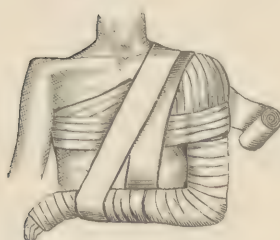


FIG. 4121.

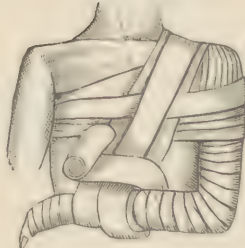
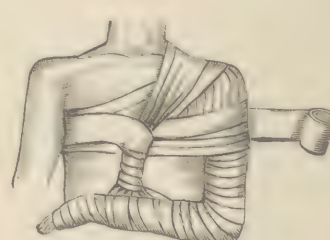


FIG. 4122.



ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Shoulder Joint Apparatus.

"When the diseased condition requires immobility, without exposure over and about the joint, it is met by the employment of the 'cable splint,' Figs. 4117—4122, devised by the writer in March, 1877, and published in the *New York Medical Record* for October 20th, 1877.

"The arm being at a right angle—the elbow being drawn down and held firmly by an assistant, the shoulders being in the same horizontal line, and the body erect and easy—the arm is encased, from the fingers to the axilla, with the plaster bandage (Fig. 4117). The next step consists in placing folds of the same bandage around the chest, covering the side of the shoulder (Fig. 4118). A shoulder cap of good thickness is then formed of strips of the same, bound down occasionally by transverse chest bands (see Fig. 4119). At this stage of the process the cable which cements the various parts together is formed. A roller of plastered bandage from three to five inches in width, and of good length, is selected. This is laid over the shoulder, as far back as the spine of the scapula, and brought forward and downward *behind* the wrist, around which it is wound several times to afford as broad a base as possible, and passed anteriorly back over the shoulder to the starting point, where it is bound down by a turn around the chest (see Fig. 4120) and again brought forward to the *front* of the wrist, under which it passes. In returning to the shoulder it is wound lightly around the three slips already passed, thus forming the *nucleus* of the cable (see Fig. 4121).

"Upon reaching the chest-band, the bandage is passed around that, until the cable is again reached (see Fig. 4122), which is once more wound to the wrist, after passing around which the bandage is returned to the shoulder in the same manner and again brought around to the cable, which is once more wound as before.

"By repeating this winding process a number of times, a plaster cable is produced of great strength, and ultimately incorporated with all parts of the apparatus, building and cementing it in a manner which prevents disarrangement of the parts covered (see Fig. 4123).

"The whole splint after the plaster has set *becomes one piece*; no part of it can be moved without moving the whole, and it absolutely prevents all motion; and, if neatly applied, with the skin protected by gauze, there is no chafing or discomfort experienced by the patient. So entirely is motion prevented that the writer has obtained union in

five weeks in extra-capsular fracture of the humerus which occurred in a patient over sixty years of age. Its advantages are:

"1st. *Absolute immobility.* The cable may be grasped and shaken rudely without giving pain to the patient or disturbing the relations of the parts beneath.

"2d. *Ease of application.*

"3d. *It does not constrict the neck*, as does the ordinary cloth sling, the weight of the arm being borne by the shoulder and upper zone of the neck.

"4th. *It prevents the leverage outwards* of the arm upon the shoulder, which is not obviated by any other apparatus now in use.

"When the diseased condition requires both immobility and exposure of the surface, a modification of the 'cable splint' may be used by which the arm is held securely and yet the shoulder is left bare. It is constructed like the 'cable splint,' but the exterior portion of the shoulder-cap is omitted, without at all impairing the stability of the apparatus."—CHAS. F. STILLMAN, M. D.

FIG. 4123.

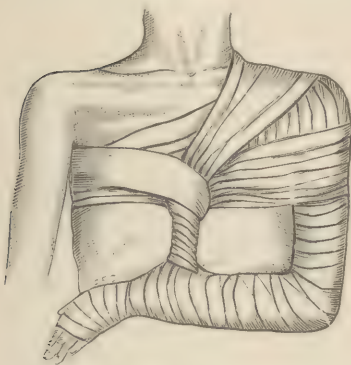
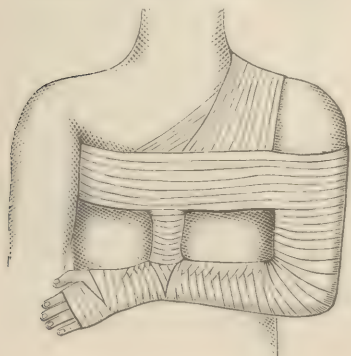


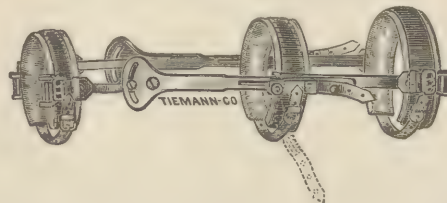
FIG. 4124.

Stillman's Modified Cable Splint.



Elbow and Wrist Splints.

FIG. 4125.—Stillman's Wrist Splint.



By means of the *sector* this splint allows the hand to be *fixed*, at any angle with the arm. By means of adhesive strips (shaped and cut like those shown on Stillman's ankle splint, Fig. 4115, and Stillman's knee splint, Fig. 4104) applied to the hand and arm, *traction* upon the wrist may be produced.

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Elbow and Wrist Splints.

"For chronic inflammation of the *wrist*, I use the following easily-constructed apparatus. A rectangle of thin brass or tin is bent into the form of half a cylinder, long enough to extend from the elbow to the tips of the fingers. At each side of the elbow is a slot and friction roller. At the other end are two eye-holes in the end of the brass, half an inch in diameter. The hand being enveloped in rubber, adhesive plaster, with tapes attached, is secured by tying the latter into the eye-holes. Other plasters on the forearm above the wrist have elastic bands attached to their upper extremities, terminating in thin leather straps. The latter pass over the friction rollers at the top of the instrument, turn downward, and are buttoned to knobs on either side. This makes perfect extension.

"If the *elbow* requires extension, either in a straight or bent position, the same principle is perfectly available by merely varying the form of the tin case. The friction rollers so often referred to are the simplest possible things, they consist of simple pieces of strong wire soldered to the brace, so as to cross the desired edge of the slot. A little cylinder of tin or brass loosely surrounds the wire, so as to revolve freely when the elastic band is drawn over it."—E. ANDREWS, M. D. (See also pages 617, 618.)

After Treatment.

"*Massage, Passive Motion.*—There is no more efficient means for reducing capillary congestion and removing infiltrated material from the tissues than gentle, free, but careful rubbing with the hand. There are those who pretend to possess remarkable healing power in their hands, and claim to be able to perform wonderful cures by rubbing, &c.; but no one of any sense believes one individual possesses any special power over another in this direction. There is no reason why any surgeon should not possess the same power and afford the same benefit to his patients as any of the most successful *manipulators*. The occasional application of electricity may also be of service. But, in resorting to any or all of these measures, the great point to be taken into consideration is to carefully guard against carrying them to such an extent as to redevelop inflammation. If at any time you have been a trifle indiscreet, and have carried your passive movements too far, or have made your manipulations too freely, so as to cause pain which shall last for more than twenty-four hours after the manipulations have ceased, or give rise to the slightest elevation of temperature about the joint, place the patient in bed immediately and apply cold and absolute rest until all inflammatory action has subsided; after which your passive movements short of exciting inflammation may be made as freely and as often as desired without danger."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre.

FIG. 4126.—Fluhrer's Swinging Cradle.



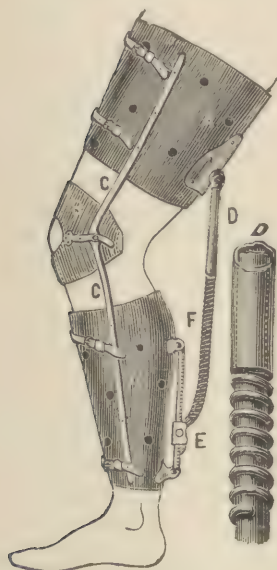
"Fluhrer's swinging cradle is for the purpose of securing rest of the extremities in treating inflammations. If one of the extremities is involved, an elevated position by means of the swinging cradle or upon a pillow, will, as a rule, give the greatest degree of comfort, especially in cases where, by reason of swelling, the circulation in the veins beyond the infiltrated portion is interfered with. In such conditions a flannel bandage, properly applied from the end of the extremity up to the inflamed area, will be advisable."—"A Text Book on Surgery." Wyeth.

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

After Treatment. Passive Movements.

FIG. 4127.—Sayre's Knee Support, for After Treatment.



"When the instrument (Fig. 4092) is removed, it is necessary for a time to apply some kind of apparatus to protect the joint against accidents, such as falls, trippings, &c., and also to prevent too free motion of the joint. For this purpose a piece of ordinary sole leather answers very well.

"Again, firm support may be given to the limb, and at the same time motion of the joint allowed within the limits of safety by the use of the following splint. It consists of leather rawhide moulds, fitting the back part of the thigh and leg, and buckled in front. These are connected by lateral steel bars, jointed at the knee; the flexion and extension are made by means of a ratchet-and-cog wheel; at the back, there is also a spiral spring on the extending rod which permits limited motion when walking. A knee-cap retains the limb in its proper position in the splint when motions are made."

DIRECTIONS FOR MEASUREMENT.

1. Circumference at upper third of thigh, Inches.
2. Circumference above knee, "
3. Circumference at knee, "
4. Circumference below knee, "
5. Circumference above ankle, "
6. Length from above ankle to knee, "
7. Length from knee to upper third of thigh, "

"There are some cases of chronic disease of the knee joint, however, in which ankylosis is the best possible result that can be obtained. Of course, the question whether you permit ankylosis to take place or not must be fully decided, if possible, before you resort to passive movements. In some cases it may be impossible to decide this question until passive movements have first been tried.

"If, after the application of the instrument, which shall maintain a constant extending and counter extending force, the joint disease goes on favorably and steadily toward a cure, and shows no disposition to recurrent attacks, you may reasonably expect that, when the inflammation has entirely subsided, passive movements and any other manipulations will restore the use of the joint completely. On the other hand, if there is a lurking tendency to the development of inflammatory action, in consequence of nearly every effort made for establishing a cure, whether it be in the way of passive movements or the ordinary means for affording extension and counter extension; or, in some cases, apparently independent of any exciting cause; in short, the diseased joint is frequently taking a new inflammatory action, and behaves badly, you may have grave apprehensions respecting the future mobility of the joint, and may reasonably regard ankylosis as a very favorable result."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M.D.

Ankylosis.

"*Complete or True.*—Ankylosis is not a disease of itself, but may be the result of any disease, affection or injury which interferes with the normal functions and motions of a joint. Ankylosis may be the most favorable termination that can occur in many diseases and accidents of the joints. In such cases it is of the most vital importance that the surgeon should select the position most advantageous for the future usefulness of the limb thus involved. As, for instance, the elbow is more useful when ankylosed at a right angle than if made straight, whereas the knee would be entirely useless if ankylosed in the same manner.

"It has been customary among surgeons, when ankylosis was the best result that could be obtained in any given case, to secure it with the leg flexed upon the thigh at an angle of 30° to 45° . From this I dissent, and recommend to secure ankylosis at the knee joint with the limb in a nearly straight position. If left to ankylose at an angle, the ankylosis is very insecure, and sometimes, as the man steps down an unexpected distance, or slips, bringing his weight suddenly to bear upon the limb bent at this angle, it may yield sufficiently to give him very serious trouble. If, on the contrary, the bones are placed in the straight position as nearly as may be, the large articulating surfaces of the tibia and condyles of the femur give such an immense expanse for attachments to be formed as to render that portion of the limb even more secure against fracture than any other part of it. The straight position has been objected to, on the ground that it places the patient in a very awkward and inconvenient attitude when sitting. That may be true, but I regard a secure position which will, perhaps, prevent any accident, as being preferable to insecurity, although it be accompanied with a greater degree of comeliness.

ORTHOPÆDIE.

DISEASES OF THE JOINTS.

Anchylosis.

False, Fibrous or Incomplete.—In chronic or long-continued inflammation of any joint, reflex irritation, producing muscular contractions, invariably takes place. This contraction not only aggravates the disease, by causing undue pressure on the parts inflamed, but also distorts the limb in accordance with the action of the most powerful muscles involved, and the distortion can only be prevented by the proper application of an extending and counter-extending force during the treatment of the disease. When this principle has been neglected, the patients frequently recover with such seriously distorted and useless limbs as to render surgical interference necessary.

"In such cases it is of the utmost importance to ascertain whether the anchylosis be complete or incomplete, as the plan of treatment depends entirely upon the accuracy of this diagnosis. If fibrous, or incomplete, it can be broken up by manual or mechanical force, aided by subcutaneous tenotomy, myotomy, and the section of such fasciæ, fibrous bands and other adhesions as have prevented its mobility; whereas, if anchylosis be true or bony, the deformity can only be relieved by section of the bone itself with the saw or other instrument.* In many cases of simple fibrous or incomplete anchylosis, the adhesions are so firm and so short as to allow of no perceptible motion, even under a very careful inspection. If any motion whatever has been made, although so slight as not to be observed at the time, the parts which have been subjected to the violence necessary for the examination will on the following day give evidence, by pain, tenderness and inflammation, that some motion must have been given to the part involved.

Breaking up Fibrous Anchylosis.

"Having made our diagnosis that the anchylosis is fibrous, and not osseous, how shall it be broken up?

"In former times gradual extension, with steaming and friction, was considered all that was necessary; but the length of time demanded and the great pain induced by this method of treatment frequently prevented the patient and surgeon from carrying it to the completion of securing perfect motion. The slow and gradual stretching of tissues, long contracted, produces reflex contractions in many instances to such a degree as to compel the treatment to be abandoned, and patients prefer to remain with their limbs in the distorted condition rather than undergo the constant pain of continued extension. In all such cases it is infinitely better to proceed to the immediate restoration of the joint to its normal position, with entire freedom and mobility, by manual force under the influence of an anæsthetic, combined with tenotomy or myotomy of subcutaneous section of the fascia, if necessary, than to resort to the slow process of gradual extension.

"Brisement Forcé.—It is of the utmost importance that manual force should not be resorted to for breaking up fibrous anchylosis until all traces of joint disease have subsided. Then we may resort to *brisement forcé*, and not until then.

"How are we to decide whether *tenotomy*, *myotomy*, or the *section of fascia* is requisite?

"Put the parts upon extreme tension, and, while thus stretched, if point pressure by the finger or thumb made on the fascia thus stretched produces reflex contractions, then that fascia, tendon or tissue must be subcutaneously divided or else forcibly ruptured before the limb can be restored to its natural position. If the tissues thus contracted can be reached with the knife, without the danger of involving large bloodvessels or nerves, section by the knife is better than forcible rupture. If it is necessary to make this subcutaneous section, it is better to do it three or four days previous to the breaking up of the joint, so that the external wound made by the tenotome may have healed before the latter operation is performed. This tenotomy may be performed under the influence of an anæsthetic or not, as the patient chooses; but, when the *brisement* proper is performed, an anæsthetic is absolutely essential. In fact, it is due to anæsthesia that *brisement forcé* has gained its reputation, and to it chiefly owes its success.

"The patient being thoroughly anæsthetized, the limb is seized by the hands of assistants, holding it with firmness between the joint involved and the trunk, while the surgeon takes the farther extremity of the limb and forcibly flexes it upon itself, which is frequently attended with sharp snaps and cracks that are sometimes quite audible and that are distinctly *felt* by the surgeon's hand while making the rupture. Having flexed it sufficiently to begin to allow of moderate movements, he then reverses the movement and forcibly extends it; and in this way, by forcible flexion and extension, continues until he has gained perfect and free motion of the joint involved, in all its normal movements. If the knee joint is involved, care must be first taken to fracture off the patella from its attachments to the femur, which is sometimes the most difficult part of the operation to be performed. Having thus obtained perfect extension and flexion, in fact the complete movements of whatever joint involved, these movements are repeated with great freedom and frequency until all the adhesions are thoroughly and completely broken up.

"One of the commonest causes of failure in the treatment of *fibrous anchylosis* by *brisement forcé* is, that the surgeon, succeeding in getting a moderate motion and becoming alarmed at the audible fractures that occur, contents himself with that slight motion for the present operation, intending to complete the cure by subsequent operations, and thus, by making frequent attempts to increase these slight movements, sets up a new inflammation in the parts involved, frequently resulting in a more firm consolidation of the joint than before; whereas, by breaking up the ad-

* See OSTEOTOMY, pages 110, 616.

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DISEASES OF THE JOINTS.

Breaking up Fibrous Anchylosis.

hesions thoroughly and completely at the time of operation, and then by proper dressings of the parts and the prevention of inflammation, he may confidently expect that he will have a much more satisfactory result.

“How are these dressings to be applied? and how is this inflammation to be prevented?”

“This I look upon as the most important part in the treatment of an anchylosed joint. For many years past I have adopted the following plan. If, for instance, it be the knee which I have broken up for *angular fibrous ankylosis*, I first strap the toes with strips of adhesive plaster, if it be a small subject, or, if an adult with long toes, pad the toes with cotton and bind with bandage, carrying the roller over the foot strongly and firmly, padding the malleoli and tendo-achillis with cotton; the roller is carried snugly over them. Strips of adhesive plaster having been placed on either side of the leg for extension, the roller is passed over them, leaving the lower extremity of the adhesive plaster exposed for the future attachment of weight and pulley, and is carried up as far as the top of the tibia. The popliteal space is then padded and firmly strapped with strips of adhesive plaster, each one shingling over the other until the entire knee is covered. The roller is then continued over the knee smoothly and very firmly until we come to the junction of the middle and lower third of the femur, when a piece of sponge an inch or two in length, or about the size of one's thumb, first being wet in cold water, is placed over the track of the femoral artery, and the roller carried on over this sponge for the purpose of making partial compression of this artery, so as to diminish its calibre and thus prevent the full supply of blood to the part below. Great caution is necessary, in the application of this pressure upon the artery, not to obstruct the circulation so as to produce gangrene—we must here *use* pressure without *abusing* it. This piece of sponge should be kept soft and elastic by wetting it occasionally with cold water through the bandages. If permitted to get dry, it will be like a hard foreign body, and the pressure made upon it will be much more liable to cause sloughing.

“The limb is then secured in absolutely immovable position, either by a wooden splint well padded placed behind the leg, gutta-percha, sole leather, plaster of Paris, iron bars on either side of it, or in any way that the surgeon may deem best for the purpose of preventing the slightest possible movement. The patient is then placed in bed, the lower extremity of which is raised ten or twelve inches higher than the head of the bed (so that the body may act as a counter-extending force), and the weight and pulley applied over the foot of the bed to the strips of adhesive plaster at the ankle joint before described (Fig. 3913). Ice bags are then placed around the knee, and such constitutional treatment, in the way of narcotics, cathartics, &c., as may be required is judiciously used. At the end of six or seven days the dressings are removed, the sponge taken from over the femoral artery, the adhesive straps cut from over the knee, and the parts carefully examined, and a very slight movement given to the joint for the purpose of preventing solidification, when the dressings are reapplied with the sponge left off from over the femoral artery. At this dressing the surgeon will often be surprised to find ecchymosis to some extent, both above and below the joint, from extravasated blood caused by the rupture of vessels at the time of the operation; but, by following the plan I have here laid down, I have never seen a case that went on to suppuration since I have adopted this method of treatment. The extension is still continued and the elevated position of the limb is preserved for some days, until all danger of inflammation is past, the surgeon exercising his judgment whether the application of ice is still to be kept up or not. At the end of a few days the dressings are again removed, and more free motion is given to the part. It may be necessary at the time of making this movement, and the three or four subsequent movements, to administer an anæsthetic; these movements should be made quite free when an anæsthetic is used, the surgeon being careful not to carry them to the point of exciting new inflammation.

“After some days the *passive movements* can be made daily, accompanied with friction, and shampooing should be very liberally done. These movements may be increased in frequency as the case advances, until, finally, an instrument can be so adjusted to the limb that the patient can cause the movements many times in the day without the attendance of his physician (see Fig. 4128). So soon as the parts can be pressed together by bearing the weight of the body upon the foot without tenderness, the extension can be omitted, and the movements daily increased.

“These are the general principles which should guide you in the management of all cases of fibrous ankylosis, whether occurring at the hip, knee, elbow, or other joints.

“When the hip joint is operated upon by *brisement forcé*, I usually secure the patient at once in the wire cuirass (Fig. 4080). The wire cuirass is also an exceedingly convenient instrument to be used when the knee-joint is broken up, especially in children. The circulation of the hip can be controlled by placing a bag of shot over the external iliac artery.

“When the elbow and wrist joints are operated upon, the sponge is placed over the brachial artery, for partial compression and control of the circulation, the same as already described when speaking of the femoral artery in reference to the prevention of inflammation of the knee. After the roller bandage and arterial compression have been properly applied, the joints are to be secured against the possibility of the *slightest motion* for a few days. After all danger of

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DISEASES OF THE JOINTS.

Breaking up Fibrous Anchylosis. Apparatus.

producing inflammation has passed, then the same general principles laid down in the treatment of ankylosis of the knee joint are to govern us, such as friction, shampooing, passive motion, &c.—being careful never to carry treatment to the extent of reëxciting inflammation.

"By the plan of treatment here given I have never had a single case of constitutional fever or suppuration following *brisement forcé* of any of the joints; but cannot urge too strongly the necessity of carrying out all the details of the after treatment I have laid down, for I have seen a number of cases in which *brisement forcé* has been performed by competent surgeons, they neglected to apply extension, and the result was that reflex muscular contraction followed, which prevented a successful termination of the operation; or, they allowed a little time to elapse after the operation before the dressings were applied, and a reaction came on which prevented their application, and disastrous inflammation followed. I regard *every* detail of the plan of treatment as essential, and cannot urge you too strongly to observe them all."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre.

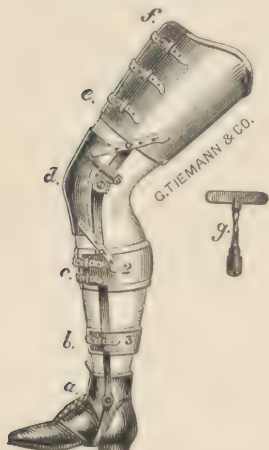
Fibrous Anchylosis Apparatus.

This apparatus is for overcoming muscular contractions of the knee joint and for favoring the re-establishment of motion in cases of false ankylosis.

It consists of metal troughs, 1, 2, 3, for the reception of the thigh and leg, united by two lateral shafts, provided with joints at the knee and ankle and attached to a shoe. A knee cap, adjusted to buttons on the lateral shafts with strong elastic straps, exerts pressure on the patella, whilst the instrument may be flexed and extended by means of a key (g) and ratchet joint, opposite the knee.

"It is an admirable apparatus for the gradual extension of contracted muscles and for favoring the re-establishment of motion in cases of false ankylosis, and of remaining stiffness and dryness after treatment of joint disease. By persistent and daily passive exercise a flexible and pliable joint may be restored without confining the patient to bed or room. The mechanism is powerful and may be moved swiftly, adapting it to the forcible breaking up of adhesions as well, should the surgeon prefer this to gradual extension. If desired, the instrument can be made to detach from the shoe, for the greater comfort of patients who are obliged to wear the apparatus continually, but wishing to remove the shoe at night. It is also the best guard against malposition, for should it be deemed impossible to effect a cure the limb may be placed in a situation (to ankylose) most conducive to its future usefulness.

FIG. 4128.
Long Anchylosis Splint.



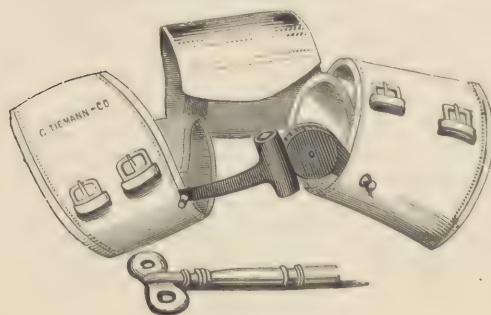
DIRECTIONS FOR MEASUREMENT.

- | | Inches. |
|--|---------|
| 1. Patient's name and age. | |
| 2. Long Anchylosis Splint, Fig. 4128. | |
| 3. Right or left. | |
| 4. Length from sole of foot to ankle joint (a), " | |
| 5. Length from sole of foot to upper third of thigh (f), " | |
| 6. Length from sole of foot to knee joint (d), " | |
| 7. Circumference above ankle (b), " | |
| 8. Circumference of calf (e), " | |
| 9. Circumference of knee (d), " | |
| 10. Circumference above knee (e), " | |
| 11. Circumference of thigh (f), " | |

If you wish us to furnish shoes, send the following additional measurements:

- | | |
|---|---------|
| a. Length of sole of foot, | Inches. |
| b. Circumference of ball of foot, | " |
| c. Circumference of instep, | " |
| d. Circumference above ankle, | " |

FIG. 4129.
Short Anchylosis Splint, for the Knee Joint.



This is the same in principle as Fig. 4128, but consists of a thigh and a calf band only. It does not keep in place as well as the long splint, but answers well in slight cases.

DIRECTIONS FOR MEASUREMENT.

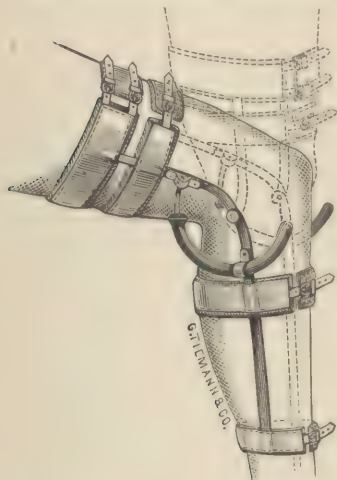
- | | Inches. |
|--|---------|
| 1. Short Anchylosis Splint, Fig. 4129. | |
| 2. Circumference of calf, | " |
| 3. Circumference of knee, | " |
| 4. Circumference above knee, | " |
| 5. Circumference of thigh, | " |
| 6. Right or left leg? | |

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FIG. 4130.

Hooper's Knee Extension Splint, for Overcoming Muscular Contractions.



Fibrous Anchylosis Apparatus.

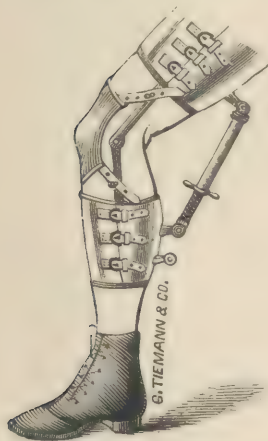
It consists of a band encircling the thigh, of another for the calf, and of one above the ankle. These are fastened to two lateral shafts provided with joints at the knee. Two semi-circular brass tubes, fastened to the lower calf shafts, contain each a spiral spring, acting on bows fastened to the thigh shaft, thus exerting constant elastic extension, which is sure to overcome muscular contraction soon.

DIRECTIONS FOR MEASUREMENT.

1. Hooper's Knee Extension Splint, Fig. 4130.
2. Circumference above knee, Inches.
3. Circumference at knee, "
4. Circumference below knee, "
5. Circumference above ankle, "
6. Length from above ankle to knee, "
7. Length from knee to upper third of thigh, "

Stromeyer's knee splint (Fig. 4131) is a simpler and lower-priced apparatus than those represented in Fig. 4128 and 4129, but not so elegant in form nor so comfortable to wear. The cut explains itself.

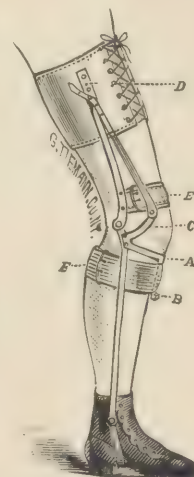
FIG. 4131.—Stromeyer's Knee Extension Splint.



DIRECTIONS FOR MEASUREMENT.

1. Stromeyer's Knee Extension Splint, Fig. 4131.
1. Patient's name.
2. Patient's age.
3. Right or left leg?
4. Length from above ankle to knee joint, . . . Inches.
5. Length from knee joint to upper third of thigh, "
6. Circumference above ankle, "
7. Circumference of the calf, "
8. Circumference of the knee, "
9. Circumference above the knee, "
10. Circumference of the thigh, "

FIG. 4132.
Robert's Elastic
Knee Extension
Splint.



Roberts' elastic extension apparatus (Fig. 4132), for ankylosis of the knee joint, is exceedingly light. Owing to its elastic attachments, there is during locomotion a slight yielding of the instrument permitted, which renders it less irksome to the wearer than an absolutely rigid apparatus. The side bars are simple light strips of steel, fastened above to a well padded encasement for the thigh, and below to the sole of the shoe. At the knee and ankle are simple hinge joints. *A* is a semi-circular steel band, made fast to the side bars below the knee. Attached to it is an adjustable metallic arm, *B*, extending downward in a line with a spine of the tibia. A broad elastic band, *F*, passes behind the head of the tibia, and over the metallic arm, *B*, which serves as a fixed point for making elastic traction upon the posterior part of the head of the tibia. *E* is an elastic band passing from one side bar to the other in front of the thigh, thus keeping the instrument in the same relative position to that part of the limb. *C* is a short lever projecting forward and curved upward. To this is attached a strong strip of elastic webbing, *C, D*, which supplements the action of the quadriceps extensor muscle, and by means of which any desired amount of elastic tension can be effected.

MEASUREMENTS REQUIRED.

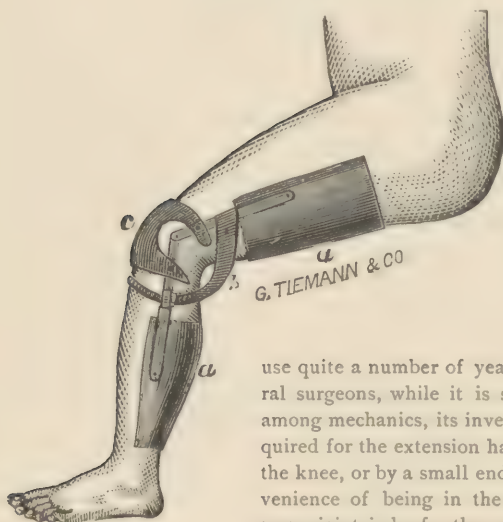
- | | |
|--|---|
| 1. Roberts' Elastic Knee Extension Splint, Fig. 4132. | 6. Circumference above ankle, Inches. |
| 2. Patient's name and age. | 7. Circumference of knee, " |
| 3. Right or left leg? Inches. | 8. Circumference above the knee, " |
| 4. Length from sole to ankle, " | 9. Circumference of the thigh, " |
| 5. Length from knee to upper third of thigh, " | |

ORTHOPÆDIC.

DISEASES OF THE JOINTS.

Fibrous Anchylosis Apparatus.

FIG. 4133.—Andrews' Instrument, for Straightening Bent Knees.



"*a, a.* Sheet steel pads, lined with chamois, embracing posterior half of leg and thigh; *b.* A curved screw, on which a nut turns, to make forced extension; *c.* Knee cap.

"Many surgeons still rivet the thigh and leg pieces, *a, a,* fast to the rods that pass to the joint of each knee, thus making each arm of the apparatus a rigid lever. The evil of this plan is that, in spite of the knee-cap, *c,* when the extension force is applied, the centre of the instrument draws back a little, and the entire pressure is made at the upper and lower ends, near the hip and the ankle. Here the instrument digs painfully into the flesh, in spite of all precautions. To avoid this, the armor pieces, *a, a,* should hang by their centres, as a cannon hangs by its trunnions, by movable joints, so that they always apply themselves painlessly to the surface of the limb, pressing equally in all parts. This part of the plan has been in

use quite a number of years, and seems to have occurred almost simultaneously to several surgeons, while it is still unaccountably neglected by others. Being an old device among mechanics, its invention cannot be specially credited to surgeons. The power required for the extension has usually been obtained either by a straight brace screw behind the knee, or by a small endless screw on the side. The straight brace screw has the inconvenience of being in the way when the patient desires to sit in a chair. The endless screw-joint is by far the neatest and most compact power that has been used, but it has the objection of being expensive; and, moreover, as it is so close to the centre of motion,

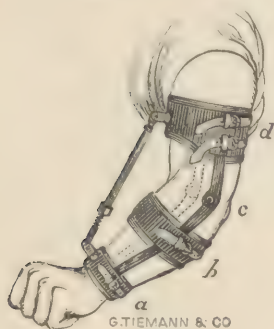
the pressure of the teeth of the semicircle is immense, and not unfrequently breaks them. Expensiveness is a serious objection for great numbers of patients who need treatment; I have, therefore, sought to combine the economy of the screw with the convenience of the endless screw-joint. For this purpose I attach on each side a simple screw, bent to a semicircle. The screw is riveted firmly to the upper arm of the instrument, and runs through a perforated projection of the lower arm. A nut, turned by a key, furnishes the requisite power to force the limb to a straight position."—E. ANDREWS, M. D.

DIRECTIONS FOR MEASUREMENT.

- | | |
|---|--|
| 1. Andrews' instrument for straightening bent knees, Fig. 4133. | 5. Circumference below the knee, Inches. |
| 2. Circumference at top of thigh, Inches. | 6. Circumference about the ankle, " |
| 3. Circumference above the knee, " | 7. Distance from centre of knee to perinæum, " |
| 4. Circumference at the knee, " | 8. Distance from knee to above mæolus, " |
| | 9. Right or left leg? |

The apparatus here represented is for the gradual extension of contracted muscles. By persistent and daily passive and active exercise, a flexible and useful joint may be restored. It may also be used for forcible breaking up of false ankylosis, if the surgeon prefers this to gradual extension. It forms also a safeguard against malposition, for should it be deemed impossible to effect a cure, the arm may be fixed in such a position to ankylose as shall give it the greatest usefulness.

DIRECTIONS FOR MEASUREMENT.

FIG. 4134.
Stromeyer's Elbow Splint.

- | | |
|---|--|
| 1. Stromeyer's Elbow Splint, Fig. 4134. | |
| 2. Right or left arm? | |
| 3. Length from wrist to elbow joint (<i>A</i> to <i>C</i>), Inches. | |
| 4. Length from wrist to axilla (<i>A</i> to <i>D</i>) " | |
| 5. Circumference of wrist (<i>A</i>), " | |
| 6. Circumference of forearm (<i>B</i>), " | |
| 7. Circumference of elbow joint (<i>C</i>), " | |
| 8. Circumference of arm (<i>D</i>), " | |

ORTHOPÆDIC.

THE SPINAL COLUMN.

Vertebræ.

"The spine is a hollow bony column, sustaining nearly the entire skeleton, and forming the principal lever of the body. Running along the entire length of the trunk, the portions included in the neck, the chest, the loins, and the pelvis have been designated respectively *cervical*, *dorsal*, *lumbar* and *sacral* or *pelvic*. Omitting the sacral portion, the column is formed of twenty-four bones (vertebræ), arranged one above the other. Seven of these vertebræ are included in the cervical region, twelve in the dorsal and five in the lumbar. These constitute the *true* vertebræ. The sacral portion is formed of nine vertebræ (five being united together to form one bone, the sacrum; four being rudimentary, constituting the coccyx); these nine are termed *false* vertebræ.

"Viewed sideways the spine presents several alternate curves. These are four in number. The column arches forward in the cervical and lumbar regions and backwards to the dorsal and sacral. Thus, looking forwards, the column is convex in the neck and loins and concave in the back and pelvis. In the rear the curves are in an opposite direction to those viewed from the front. The first three curves have a direct dependence the one upon the other. For example, if the cervical convexity be more marked than common, the dorsal and lumbar curves will be found also to be more convex. The mutual relationship of the curves is such that the least modification of one brings about a corresponding modification in the others. Notwithstanding this, it has been found impossible to submit these curves in the living subject to a rigid calculation. The varying conditions of the living body set at defiance those exact measurements which can be applied to inorganic substance. The mechanism of the spinal column is very wonderful. Singularly rigid in structure, it is, nevertheless, exceedingly light and possesses rare elasticity and pliancy—a combination of mechanical properties which man has in vain attempted to imitate. The numerous bones of which the column is built, while securing mobility, do not, against all human estimates of probability, sacrifice solidity. It happens, indeed, as Cruveilhier has shown, that the numerous articulations by which the vertebræ are connected, are all seats of force when the spine is subjected to shocks. A portion of the movement impressed upon the column produces slight displacement of the articular surfaces, and this portion is entirely lost for the transmission of the shock. If the vertebral column were formed of one piece, a force impressed, being transmitted without any loss, would be much more apt to occasion injury to the structure of the nervous centre which it sheathes. The aptitude to suffer from shock is still further diminished, and the mobility of the column increased, by the interposition of a thick elastic cartilage between each pair of vertebræ. The canal which traverses the column, for the reception of the spinal marrow, serves also the same purpose as the cylinder of the long bones, that is to say, it augments the resistance without increasing the weight. The alternate inflections of the column permit much greater variations of its centre of gravity than if the vertebræ had been arranged rectilinearly, while at the same time they increase the vertical motion.

"The different vertebræ are firmly bound together by strong elastic ligaments, and the whole spine is *stayed*, so to speak, by numerous powerful muscles. The ligaments, by their great elasticity, incessantly struggle against those causes which tend to throw the column awry. They exercise also an important influence in maintaining the curves. But the ligaments and the wonderful articulation and construction of the spine would not, without the aid of the powerful muscles which occupy the grooves of the column and are attached to its numerous processes, suffice for the maintenance of the erect position. The force of the muscles is exactly proportionate to the weight they have to overcome. Hence, in health, the act of standing occurs without perceptible effort. The erect position is not, however, a state of repose, as is shown by the sensation of fatigue in the lumbar region after long standing, and the relief afforded by resting the body forwards. As an organ of support for the head and trunk, the spine has a solid base of sustentation at its junction with the pelvis. In whatever position the body may be placed the spine at this point remains in a quiescent state.

"When the spinal column is in motion, the centre of gravity, according to the researches of Weber, is placed within the area of junction between the column and the pelvis, and it rarely rises more than a slight space above the point of attachment. Hence the equilibrium between the head and the body is left almost undisturbed."—"Orthopraxy." Heather Bigg.

Spinal Curvature.

"The spine is subject to various deviations, malformations, or deformities, known by the general appellation of curvature. The abnormal deviations of the spine may be arranged under the three heads of *lateral*, *posterior* and *anterior*, their respective frequency being in the order here stated. From this list I purposely exclude that form of curvature caused by tuberculosis, caries, or *Pott's disease* of the spine, and generally known as *angular curvature*. These several deformities may exist singly, as the only departure from the natural standard, or, as not infrequently happens, they may occur in connection with each other. However this may be, they all are due, as was long ago correctly remarked by Cruveilhier, to the following causes: 1. The wasting of the vertebræ by caries or softening; 2. Want of equilibrium between the strength of the vertebral column and the weight of the body, either alone or when oppressed by burdens; 3. Muscular traction; 4. The frequent repetition of any attitude in which the column is bent."—"System of Surgery." Gross.

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Caries, Spondylitis, Angular Curvature or Pott's Disease. Braces.

FIG. 4135.—Angular Curvature of the Spine.



"*Angular curvature*, or Pott's disease, is caused by inflammation of the bodies of the vertebrae and of the intervertebral substance, usually commencing in the latter. It is often accompanied with tubercle, and some hold that it is essentially a scrofulous disease. The immediate cause of the curvature is caries, and it most commonly shows during the period of bodily development, usually attacking the lower dorsal region. Recovery sometimes takes place without pus making its appearance, but 'spinal abscess' is a common accompaniment, the pus pointing in the groin and finding its way from the dorsal region beneath the fascia of the psoas muscle, under Poupart's ligament, forming what is known as 'psoas abscess.' The pus sometimes burrows beneath the muscles and involves the whole thigh. The abscess sometimes appears above Poupart's ligament and sometimes in the loin, forming in the latter case 'lumbar abscess.' When the cervical vertebrae are affected, the abscess appears in the pharynx. Angular curvature is not difficult of diagnosis, as the ill health, suppuration and deformity are highly indicative. The initiatory symptoms are also not obscure, the principal being the persistent local pain and difficulty in bending the back, accompanied by great general disturbance and hectic fever. After curvature has taken place recovery is always accompanied by ankylosis, from union of newly-formed bony tissue.

"The treatment requires careful attention to the general health, including good diet and the employment of tonics and alteratives, such as iron, quinine, iodine and cod-liver oil. The local applications of fomentations and leeches and counter-irritants are also serviceable. Setons, moxas, and mercury, as tending to exhaust the strength, are to be avoided. *On getting up, the patient's back should be supported by some kind of mechanical appliance.* The abscess should not be opened too hastily, for it may be absorbed; but when it progresses steadily a free opening should be made under a piece of lint saturated with carbolated oil, to prevent entrance of air."—"American Cyclopædia."

"Destructive osteitis of the vertebrae, commonly known as Potts' disease, occurs usually between the third and fifteenth year of life. It is a disease of the growing period, when rapid nutritive changes are taking place in the bones. While no portion of the spine is exempt, the disease is much more frequent in the dorsal vertebrae. Judicious medication, good food and pure air are the indications in the constitutional treatment. In the mechanical treatment the indications are to secure fixation of the spinal column in the position of least discomfort to the patient. The character of the mechanism to be used will depend in good part upon the portion of the vertebral column involved."—"Text Book on Surgery." John A. Wyeth, M. D.

FIG. 4136.—Davis' Apparatus for Caries of the Spine.



"The principles which ought to govern the construction and application of mechanical supports, in cases of caries of the spine, are the greatest degree of lightness compatible with the requisite firmness; accurate adaptation; pressure in opposing directions upon the spinal column, sufficient to secure support and steadiness, and to transfer, in some degree, the weight of the spinal column from the affected vertebrae to their corresponding oblique processes, while at the same time these vertebrae shall not separate from each other in a manner to defeat the end desired, namely, their final union and consolidation by callus; the pressure being so applied on either side of the spinous processes, and not upon the processes themselves, so that it shall cause the least pain and not endanger ulceration or excoriation, giving support to the tumid or pendulous belly; interfering in no way with the free motions of the arms or legs. These indications we find more or less completely fulfilled in the apparatus of Davis, Bigg or Taylor."—"Principles and Practice of Surgery." Hamilton.

FIG. 4137.—Taylor's Apparatus for Caries of the Spine.

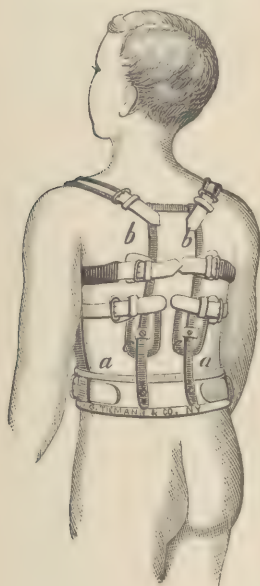


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SPINAL DISEASES AND DEFORMITIES.

Caries, Spondylitis, Angular Curvature, Pott's Disease. Braces.

FIG. 4138.
Washburn's Spine Brace.



"Some years ago it became necessary for me to have constructed a brace for the treatment of angular curvature of the spine, a considerable number of such cases having been quite suddenly thrown upon my hands by the resignation of a consulting orthopædist to St. Luke's Hospital, New York. It was my desire to obtain an apparatus, which, while fulfilling the indications perfectly, should be simple in construction and not expensive.

"In the accompanying figure *aa* is a steel band, which passes half way around the pelvis, just above the trochanters; *bb* are two flat bars of steel, parallel to each other, and curved upon their flattened sides to the form of the spine to which the apparatus is fitted. These bars are curved a little less than the spine, so that, when secured in position, their elasticity will constantly operate to rectify the spinal curve. The cross bar at the upper ends of the parallel ones is firmly riveted to them, and is to cross the back just above the spines of the scapulæ. At the ends of this bar are affixed buckles to receive the shoulder straps; *cc* are two movable pads which slide upon the bars to which they are attached—these are best stuffed with chopped cork. These compresses are to be brought one upon each side of the projecting knuckle of spine and secured firmly by means of the screws provided for that purpose. Buckles are attached to various parts of the brace, by means of which it is secured to the front part of the apparatus, which consists, as shown, of a piece of twilled muslin, or other strong material, which covers the chest and abdomen and is provided with straps. Such parts as are in contact with the body are carefully padded.

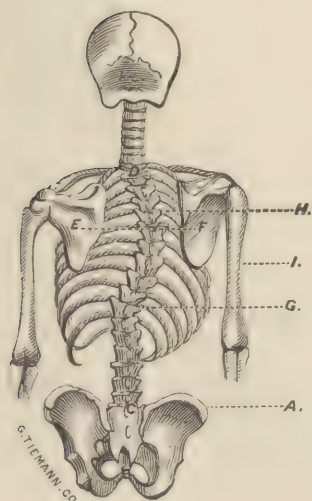
"Success with this apparatus depends entirely upon the faithfulness with which it is kept adjusted to the spine of the patient. It is only necessary that a gentle pressure should be maintained if it is constant. As the spine approaches its normal shape the curve of the brace will require to be altered from time to time. The steel has a soft temper, so that it will take the form into which it is bent when considerable

power is applied, but will be sufficiently elastic for the purposes of this apparatus."—WASHBURN.

"The downward pressure upon the bodies of the vertebrae and their breaking down, can be in great part obviated by *backward bending* of the spine, in which manœuvre the pressure is transferred from the bodies and intervertebral disks to the articular processes and pedicles. The spinal braces of Drs. Davis, Taylor, Shaffer, Washburn, &c., have been constructed with the view to accomplish this. In appropriate cases each of these forms of apparatus, if properly adjusted and intelligently worn, will accomplish all that is possible in the mechanical treatment of Pott's disease.

Much of the discredit which is brought upon particular apparatus, can justly be charged to the lack of judgment in the selection of cases, want of skill in the adjustment of the instrument and failure on the part of the attendant or patient in persisting in its use a sufficient length of time."—"Text-Book on Surgery," John A. Wyeth, M. D. 1887.

FIG. 4139.



MEASUREMENTS REQUIRED FOR FIGS. 4136, 4137 and 4138.

- | | |
|--|---------|
| 1. Davis, Taylor's or Washburn's Brace. | |
| 2. Patient's age, name (or sex). | |
| 3. Patient's weight (estimated). | Inches. |
| 4. Distance from sacro lumbar articulation to vertebra prominens (<i>C</i> to <i>D</i>), | " |
| 5. Distance from sacro lumbar articulation to first vertebra involved <i>C</i> to <i>G</i>), | " |
| 6. Distance from sacro lumbar articulation to the last vertebra involved (<i>C</i> to <i>D</i>), | " |
| 7. Distance from crest of ilium to axilla, right side (<i>A</i> to <i>H</i>), | " |
| 8. Distance from crest of ilium to axilla, left side (<i>A</i> to <i>H</i>), | " |
| 9. Distance from the centre of one scapula to the centre of the other (<i>E</i> to <i>F</i>), | " |
| 10. Horizontal (transverse) diameter of the protuberance, | " |
| 11. Circumference of chest under axilla (<i>H</i>), | " |
| 12. Circumference of pelvis one inch below the iliac crests, | " |

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"*Pott's Disease*.—This name was applied to this disease because Percival Pott first accurately described it in 1783; but it should be called *spondylitis*, from *σπόνδυλος*, a vertebra, as this name gives an accurate idea of its pathology and also its location, viz.: an inflammation of the vertebra. This disease may occur at any period of life, but is much more likely to occur in childhood, and especially in those children who are reckless and careless and expose themselves to all sorts of accidents. It also occurs more frequently among boys than among girls, because they are more exposed to accidents. With regard to this affection I have arrived at the conclusion, based upon an accurate and carefully recorded experience, that it is produced almost always, if not always, by some injury to the bone or cartilage, and is hence *traumatic* in its origin.

"By the profession in general, Pott's disease, above all others, has been considered as essentially of strumous origin; as depending upon a tuberculous diathesis, and not occurring unless constitutional dyscrasia is present; but, in my own judgment, it much more frequently depends upon some injury than upon any constitutional condition. The very fact that hundreds of people are walking about distorted—in many cases to a great degree—and yet remain in this condition and enjoy an average degree of health until they have reached a good old age, is evidence that the disease which has produced the deformity is not necessarily tubercular in character. The accidents which produce this disease are usually concussions and blows. Those children who are generally full of play may, in some of their careless pranks, jump from some height and come down straight without bending the knees or hips, thereby giving a sudden and severe concussion to the bodies of the vertebræ and their intervetebral disks of cartilage, and in this manner disturbing some centre of ossification to such an extent that inflammatory action follows and the case terminates in inflammatory softening and disintegration of the bone itself.

"After such disturbance or separation of one or more ossific centres of the vertebræ, several months may elapse before attention is drawn to the case, and perhaps by that time the bones have been partially destroyed and the distortion developed. Then it is said at once that the exhausted condition which may be present is evidence of constitutional cachexia, whereas it is simply the result of long-continued suffering from a local disease dependent upon some direct injury to the parts involved. Abscesses, commonly known as psoas or lumbar abscess, are quite frequently developed in connection with this disease, and the pus formed among the diseased vertebræ becomes imprisoned by the fibrous tissue with which it is surrounded, and does not reach the surface, in many cases, as in an ordinary abscess, but must travel along under the sheath of the tendons until it reaches the point where psoas abscesses usually show themselves. This may require a long time and give rise to serious constitutional disturbances. In some cases these abscesses penetrate the tissues and present themselves between the ribs. When the disease has advanced so far that inflammatory softening and degeneration of the bone are present, the weight of the body upon the inflamed and degenerating parts will cause absorption to take place, which will go on most markedly upon the anterior portion of the bodies of the vertebræ; and, as they lose their thickness at this point, the bodies fall together and this causes the spinous processes to assume a peculiar shaped prominence, which has given rise to the name, posterior *angular* curvature.

"*Symptoms*.—The symptoms of this disease vary according to its location in the spinal column. When it has advanced far enough to produce a deformity, there is usually no difficulty in diagnosis; but the disease has existed long before the deformity is observed; and the important point is to diagnosticate the disease before the deformity occurs. The symptoms at the beginning are sometimes very obscure; but the nerves that make their exit from the spinal canal, at points opposite to the seat of the disease, becoming more or less involved, will manifest such disturbance by symptoms developed at their distal extremities. For instance, if the disease is situated in the cervical region, long before any distortion appears the patient will complain of difficulty in swallowing; many have a choking sensation, as if there were a string around the neck; difficulty about the larynx, producing an irritable and continued cough; pain in the thorax, &c. Such symptoms may be the only ones present that will attract attention, but they are sufficient to arouse your suspicions, and, if you cannot, by means of the laryngoscope and physical examination of the chest, detect any disease of the larynx or lungs, or any of the thoracic organs, sufficient to account for the symptoms present, you should at once make a thorough examination of the spine.

"When the disease is in the dorsal region the patient very often complains of pain in the lower part of the chest and upper part of the abdomen; also a *constricting* sensation, as if a band were around the body; complains more or less of indigestion and flatulence, and may have been treated for dyspepsia. He may also complain of pain in the chest, pain about the heart, and perhaps may have been treated for rheumatism.

"Again, when the disease is lower down in the spinal column, he may have a sense of *constriction* about the abdomen, may suffer from constipation and flatulence, and perhaps have been treated for worms. When the disease is still lower in the spine, the leading symptoms may be referable to the bladder and rectum. The *chief* symptom may be frequent desire to pass the urine. The patient may also suffer from radiating pains down the thighs. When such symptoms are present and they cannot be explained by the presence of some well-recognized disease, always go back

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to the point where the nerves distributed to these regions make their exit from the spinal canal, and carefully examine the bony structures which surround them. Early in the progress of the disease reflex contractions are excited among the muscles, which result in a change in the appearance and action of the child that is worthy of special attention.

"Every joint of the lower extremities is bent, for the purpose of preventing any concussion from affecting the bodies of the vertebræ. The chin is made to project, the shoulders become elevated, and it is impossible for the child to stand upright and receive any concussion whatever, which may be communicated to the bodies of the vertebræ, without suffering pain. The muscles of the back are held rigid, in order to prevent any movements of the bodies of the vertebræ upon each other. The child is unable to stoop down and pick up any object upon the floor, but, if asked to do so, he begins by bending his hips, and then his knees, and finally reaches the object by squatting down to it. These patients never bend the back forward, for bending it thus presses the bodies of the vertebræ together and gives rise to pain; consequently all the movements of the child are directed in such a manner as to prevent any motion in the spinal column. When walking about the room the child will reach with his hands from one article of furniture to another, making careful calculation that he shall not be deprived of the support furnished by one object before he receives that derived from another. If he cannot obtain any support by catching hold of various articles within reach, he will rest his hands upon his thighs, in order to transmit the weight of the head and shoulders through the legs to the ground, thereby giving them support without bearing upon the diseased vertebræ. When the child is walking about, particularly if the disease is in the dorsal or lower cervical region, he breathes in a short, grunting manner, because of the constant effort on the part of the muscles to hold the trunk still. In other words, there is a constant effort to put a *muscular splint* on the child's body to prevent motion in the spinal column, and thus the child by his short, grunting breath and muscular rigidity, is trying to teach us doctors what the indications for treatment are in his case. The pressure upon the intercostal nerves is sometimes so great as to produce almost spasmodic respiration. When, therefore, a case presents itself in which the patient complains of cough, indigestion, disturbances about the bladder or rectum, or constant and persistent pain in the chest or abdomen, and you are not able to detect any disease of the lungs, stomach, liver, or other organs, which will account for the development of such symptoms, *do not fail to examine the spine*. The question now arises, How is this to be done? In the first place, put some object upon the floor and ask the child to pick it up, and then carefully note the position he assumes while performing the act. If the vertebræ are diseased, he will squat down and pick up the object in the manner just described and rise up in the same careful way that he went down, keeping the back as nearly straight as possible and allowing no movements in the spinal column which he can prevent. He never bends over like a healthy child, but keeps his spinal column as free from movement as possible.

"You will then strip the child naked and lay him across your lap, face down, with the arms over one thigh and the legs over the other, and then gradually separate your thighs. When that is done the first thing you will notice, probably, will be that the child takes a long breath, a long-drawn sigh of relief, *a full inspiration and complete expiration*. As long as the child is held in that manner he will be perfectly comfortable and breathe easily, if you do not carry the extension so far as to produce reflex muscular contraction. Then close the thighs again and the muscles are at once excited to contract, and the child again begins his short, catching respiration. There may be more or less spasmodic muscular action all over the body when the extension is removed; but, if there is not, it can be very easily developed by placing one hand upon the head and the other under the sacrum and crowding the bodies of the vertebræ together. The instant this is done you will see a spasm, probably of both legs and arms, and the child will cry out on account of the pain; but, the moment extension is made, he is perfectly easy again. Now, all this can be done when the disease is in the anterior part of the bodies of the vertebræ, or in the vertebral disks; but it may be, in the case which you are examining, that the anterior portion of the body and the disks have not yet become involved, and yet the child is suffering from spondylitis. For, when the dorsal portion of the spinal column is affected, the disease does not always attack the anterior portion of the bodies of the vertebræ at first, but the part most extensively involved may be upon the sides of the vertebræ, where they form a junction with the ribs.

"In these cases the blow or injury is generally received upon the sides of the body, and the heads of the ribs are driven against the vertebræ with such force as to give rise to a starting point for an inflammation. Consequently you must not be content with examining the spinal column, as far as the bodies of the vertebræ alone are concerned, but you must test the sides of the vertebræ by pressing the heads of the ribs against their articulating facets. You may be able to press the spine down without producing pain, percuss the spine without producing pain and the spinal column may apparently be straight, all of which might lead you to the conclusion that it is not diseased; but pressure upon the ribs, which will bring their heads in contact with the articulating facets, gives the patient pain and at once you have evidence of diseased vertebræ. By pressing upon the ribs separately in this manner, the exact location of the disease can be determined.

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"If the disease be located in the anterior portion of the vertebræ, the child being then placed across the lap, and extension made, a moderate downward pressure upon the spinous processes will make him more comfortable. The fact that pressure can be made over the spinous processes without causing pain, is regarded by many as evidence that no disease of the bones is present. But it is the anterior portion of the body of the vertebræ that is affected, and, when these begin to give way, the spinous processes begin to project, and by crowding upon them we remove the pressure from the diseased surfaces, and consequently the suffering of the patient is diminished. There are some cases in which no definite symptoms can be obtained by examining the patient in the manner described. In such cases the application of ice or intense heat may be of service; for the nerves, made irritable by the disease, will receive impressions much quicker than they do normally. so that when a piece of ice, or a vial or thimble containing hot water, is passed along the spine, no response is obtained until the point opposite the disease is reached, when there will be a sudden movement of the body, as if to get out of the way of the irritant. On the same principle Dr. Rosenthal has advised the application of a strong faradic current to test the different points of sensibility along the spinal column. In this manner you will sometimes be able to spell out cases which cannot be easily examined in any other way, and also by the delicate surface thermometer (Fig. 1017) devised by Dr. Seguin, of this city, you will be able to detect an elevation of temperature over the inflamed part that you could not otherwise discover. * * * *

"As to the theory relating to the etiology of the disease I simply wish to make these points: That it is the result of injury in almost all cases; this injury is followed by inflammatory action; it can be diagnosticated by making extension and counter extension upon the spine and by pressure upon the sides of the vertebræ; also by symptoms referable to the distal extremities of the nerves involved in the disease, long before the deformity is produced, and, being detected in this early stage, can frequently be cured without any deformity occurring.

FIG. 4140.—Sayre's Plaster of Paris Jacket.



"*Treatment.*—In the earlier stages (and it is during this period that treatment is most important) there is nothing which can compare with *rest* and freedom from pressure, absolute and complete. For pressure upon the parts diseased causes more rapid softening, degeneration and absorption, and in this manner a permanent deformity may be very rapidly developed. The great object in the direct treatment of spondylitis is to maintain *rest* and *freedom from pressure of the affected parts*, by such means as will not debar the patient from the benefits of fresh air, sunlight and change of scene. The patient should not be permitted to assume the upright position before he has been fitted with some artificial support capable of removing all pressure from the bodies of the diseased vertebræ. This can be done only by an accurately fitting apparatus applied to the *body* itself when extended."

"This plan of applying a plaster dressing completely around the body, from the pelvis to the axillæ, has constituted almost the only treatment which I have adopted for spondylitis. I have used it in many hundreds of cases, and in each instance with great benefit.

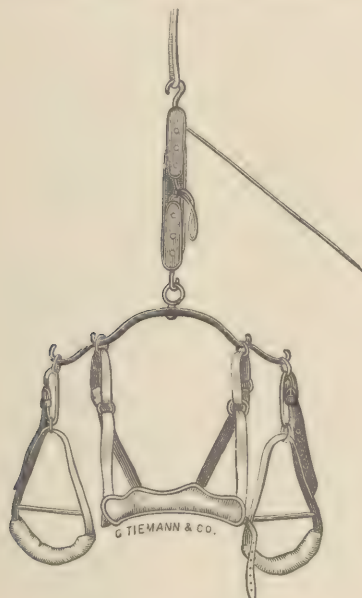
"*Preparation of the Bandages.*—The bandages used in the application of this treatment must consist of some loosely woven material, such as cross-barred muslin, mosquito netting or crinoline. This should be torn into strips, three yards long and from two and a half to three inches wide, according to the size of the patient upon whom it is to be used. Its meshes must be completely filled by drawing the bandage through very fine and freshly-ground plaster of Paris that has not long been exposed to the air—this plaster at the same time *being thoroughly rubbed into the material*. Each strip should then be loosely

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FIG. 4141.—Suspension Apparatus.



rolled up, so as to form an ordinary roller bandage. Several of these bandages thus prepared may be kept ready for use in an air-tight tin vessel. When required, they are *set on end*, one at a time, in a basin containing sufficient depth of water to *cover them entirely*. A free escape of bubbles of gas through the water will be observed for a short time; when this has ceased, the bandage is ready for use.

Preparation of the Patient.—The surface of the skin should be protected by an elastic but closely fitting shirt or vest, without armlets, but with tabs to tie over the shoulders, and composed of some soft woven or knitted material.

“For the purpose of suspending the patient during the application of the dressing, I make use of a very convenient apparatus, which consists of a curved iron cross-beam, to which is attached an adjustable head-and-chin collar with straps, and also two axillary bands. To a ring in the centre of the bar is hooked a pulley, the other end of which is secured either to a hook in the ceiling or to the top of an iron tripod about ten feet in height.

“The head-and-chin collar and the axillary supports having been carefully adjusted, the patient is gradually drawn up until he feels comfortable. Before applying the plaster bandage, I place over the abdomen, between the shirt and the skin, a pad composed of a towel folded up so as to form a wedge-shaped mass, the thin edge being directed downward. This is intended to leave room, when removed, for the expansion of the abdomen after meals, and so I call it the ‘dinner pad.’ It is important to make it thin where it comes under the lower edge of the jacket, or else the jacket would fit too loosely about the lower part of the abdomen. It

should be taken out just before the plaster sets. It is always a good plan to get the patient to eat a hearty meal before the jacket is applied, but this precaution of allowing room for meals should never be neglected.

“If there are any very prominent spinous process which, at the same time, may have become inflamed in consequence of pressure produced by instruments previously worn, or from lying in bed, such processes should be guarded by little pads of cotton or cloth, or little glove fingers filled with wool placed on either side of them. Another detail, which I have found to be of practical value in some cases, is the application under the shirt, over each anterior iliac spine, of two or three thicknesses of folded cloth three or four inches in length. If these little pads be removed just before the plaster has completely set, such bony processes will be left free from pressure.

“If the patient be a female, and especially if she be developing at the time, it will be necessary to apply a pad under the shirt over each breast before the plaster bandage is put on. These pads should be removed just before the plaster sets, and at the same time slight pressure should be made over the sternum for the purpose of indenting the central portion of the plaster jacket, and of thus giving form to the body, and of removing pressure from the breasts.

“The skin-fitting shirt having been tied over the shoulders and then pulled down, and kept stretched by means of tapes applied, one in front, the other behind, near its lower edge, and tied tightly over a handkerchief placed on the perinæum, the patient is to be gently and slowly drawn up by means of the apparatus until he feels perfectly comfortable, and *never beyond that point*, and while he is retained in this position the plaster bandage is to be applied.

“A prepared and saturated roller, which has been gently squeezed to remove all surplus water, is now applied around the smallest part of the body, and is carried around and around the trunk downward to the crest of the ilium and a little beyond it, and afterward from below upward in a spiral direction, until the entire trunk from the pelvis to the axillæ has been encased. The bandage should be placed smoothly around the body, not drawn too tight, and especial care taken not to have any single turn of the bandage tighter than the rest. Each layer of bandage should be rubbed most thoroughly with the hand by an assistant, that the plaster may be closely incorporated in the meshes of the crinoline, and bind together the various bandages which make up the jacket, thus making it much stronger than if attention is not paid to this particular. If you notice any spot which seems weak or likely to give way, pass the bandage over it and then fold it back on itself, and do this until you have placed several thicknesses of bandage over this point, being careful to wet all well together, and then pass a turn completely around the trunk to retain any ends which might have a tendency to become detached.

“In a very short time the plaster sets with sufficient firmness, so that the patient can be removed from the suspending apparatus and laid upon his face or back on a hair mattress, or—what is preferable, especially when there is

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much projection of the spinous processes or sternum—an air-bed. Before the plaster has completely set, the dinner pad is to be removed and the plaster gently pressed in with the hand in front of each iliac spinous process, for the purpose of widening the jacket over the bony projections. In the case of a young child with a small pelvis it may happen that the circumference of the body at the umbilicus is as great as around the pelvis, but, as the soft parts in the lumbar region allow us to mould the plaster as we choose, you can still obtain a point of support at the pelvis; if, as the jacket hardens, you will press it in at the sides above the ilium and in front and rear above the pubes, the antero-posterior diameter above will be longer while below it will be the transverse one.

'If any abscess be present, they must be freely opened antiseptically, at the most dependent part, and their contents completely abstracted. The surgeon will occasionally find large masses of sloughing connective tissue, having the appearance of wads of wet cotton, all of which should be removed. After each abscess has been thoroughly evacuated, fill the cavity with Peruvian balsam, place oakum over the opening and cover it with a piece of oil-silk. Then place on this a piece of folded pasteboard somewhat larger than the abscess, carrying a long sharp pin through its outer leaf. Now pull down the shirt and the pin will project, indicating the point of the abscess, and each turn of the bandage can be carried over the pin without forcing it into the abscess cavity below, and the surgeon is furnished with a guide in making an opening which shall lead directly to the diseased surface. When the plaster has nearly set, the bandage should be cut away around the pin until the shirt is reached, when the latter should be starred, or cut in strips from the pin till an opening has been made of sufficient size to remove the pasteboard. The oil-silk which is then exposed should be starred in the same manner from the centre, so that when the strips are reversed they will cover the edges in the opening of the plaster, where they can be glued down with gum shellac. In this manner you will establish a fenestra for drainage that leads directly to the abscess.

"There are some cases of spondylitis in which the cervical or upper dorsal vertebræ, or both together, are involved. In these cases, treatment by the plaster jacket alone can do but little if any good. It then becomes necessary to treat the disease by the use of an instrument which I call the 'jury-mast.' This consists of two pieces of malleable iron, bent to fit the curve of the back. To the lower portion are attached two or more strips of tin, long enough to go nearly around the body. These strips are roughened like a nutmeg grater, by having holes punched through them in

both directions, in order to firmly fasten the strips to the jacket. The tins must be rough on both sides, else the layer of the jacket on the smooth side will not hold the tin, and the jury-mast will slip up and down.

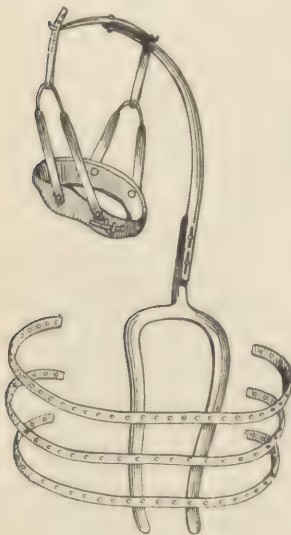
"From two cross-bars at the upper extremity of the curved iron pieces springs a central steel shaft, carried in a curve over the top of the head, and capable of being elongated at will. To this is attached at its upper extremity a swivel cross-bar with hooks, from which depend straps supporting a head-and-chin collar. This cross-bar must be placed above the curved steel arm, or it will be liable to become detached, owing to the constant traction on the screw by which it is held in place.

"The apparatus is thus applied: The patient, having been encased in the usual manner in a few thicknesses of plaster roller, the jury-mast is put on over this, care being taken that the malleable iron strips are bent so as to conform to the surface of the plaster on each side of the spine and that the shaft over the head be kept in the same line with the spinous processes. The extremity to which the swivel cross-bar is attached should be over the vertex of the head, so that, when the straps are applied, the line of traction shall be neither too far forward nor too far back. The perforated tins are carried partially around the body. The apparatus having been thus carefully adjusted, fresh layers of plaster bandage are applied over it, in order to hold the instrument firmly in its place, the assistant being careful to rub the bandage into all the inequalities caused by the instrument.

"After the jacket has thoroughly hardened, the chin-piece is to be applied around the patient's neck, so that it supports the chin and occiput comfortably, and the straps attached to it are hooked on the cross-bar, the degree of traction made upon them being regulated by the feelings of the patient.

"I wish to give, or rather repeat, a word of caution, fearing that I may not have enforced it with sufficient distinctness already. It is this: do not attempt the impossible! do not try to straighten curved spines the result of *caries* that have become partially or completely consolidated. If nature has already thrown out ossific matter and adhesions are beginning to take place, *do not break them up* by too severe extension, but simply extend the patient very slowly, so that the contracted muscles alone will yield, *until the patient says he feels com-*

FIG. 4142.—Sayre's Jury-Mast, with three strips of tin.



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SPINAL DISEASES AND DEFORMITIES.

Caries, Spondylitis, Angular Curvature, Pott's Disease.

FIG. 4143.—Sayre's Plaster of Paris Jacket and Jury-Mast, applied.



fortable, and never beyond that point. If it is a child who cannot talk, watch its countenance, and as soon as the expression of *pain* changes to one of *pleasure*, *there stop* and *secure* your patient by the plaster of Paris bandages, keeping him in that position until the plaster has set; he will then retain this sense of comfort so long as the bandage is properly adjusted."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M. D.

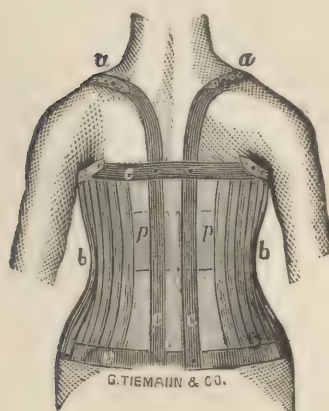
"Nil Desperandum in Spinal Caries.

"The Doctor said it was never too early to employ mechanical support, and *never too late*. Expectant treatment was a blunder.

"Diagnosis was easy long before deformity. Sudden cramping pain in the abdomen and sides, stiffness in walking in the morning, inability to stoop forward and touch the floor, 'toeing in,' and holding the shoulders high and stiff. If an infant, it will scream on being moved and lifted. There was not generally pain or tenderness in the back, and it was a great mistake to pronounce that there is nothing the matter with the spine because that symptom was absent. The disease often follows whooping cough, and very often can be traced to a fall or other injury.

"It was *never too late*, and it is a great error to suppose that strength was necessary to bear a surgical apparatus; when local irritation was wasting the vital energies, mechanical support was the best tonic, without which medication was vain. The Doctor cited a case of a boy, six years of age, with cervical caries following whooping cough two years before; complete paralysis; wasted to a skeleton; racking cough. The brace gave immediate relief, and in a week he slept and ate well, and could move two fingers; and in two weeks his toes and arms. In five months he could walk alone."—A paper by Dr. Benjamin Lee, of Philadelphia, in *The Medical Record*, June 6, 1885.

FIG. 4144.
Andrews' Spine Brace.



"The construction of a proper spinal supporter requires the presence of the patient. Whenever possible, there should be applied to the case the combined skill of the surgeon and of the instrument maker, for the proper adaptation of apparatus to the varying needs of spinal disease is a matter of considerable difficulty.

"There are only two principles (*i. e.*, *splint* and *corset*) of any real value in this class of apparatus. *First.* The *splint principle*, which, applying steel splints with proper pads along either side of the spine, seeks to lash the body firmly back to the splints. This is not merely an attempt mechanically to arrest the growth of the deformity; it is curative of the inflammation. Every vertebra rests on three surfaces of support, viz.: the body of the bone in front and the two articular processes behind. The body of the bone is alone diseased, and its inflammation is perpetuated by the rocking and pressure of the other vertebrae upon it. The articular processes are perfectly healthy in most cases. Now, by flexing the spine well back against the splint, the pressure is brought upon the healthy articular processes, and taken off from the bodies of the vertebrae, which, being thus relieved, get well spontaneously.

"*Second.* The *corset principle*, which is best adapted to the adult female form. Here the wide spread of the hips makes a rapidly sloping frustum formed by the chest, the junction of the two being at the smallest point of the waist. If a well-fitted corset, full of whalebone, be applied, and be made so as to lace in

front, instead of using the ordinary steel locks, the action is as follows: The inverted cone of the waist rests in the hollow cone of the upper half of the corset. Now, by drawing upon the strings at the lower cone, the corset tends to rise on the slope of the hips and to push up the cone of the chest with it.

"Now, it is easy to combine both these principles in one instrument, as shown above. The engraving and explanation (Fig. 4144) will render the plan clear."—E. ANDREWS, M. D.

ORTHOPÆDIC.

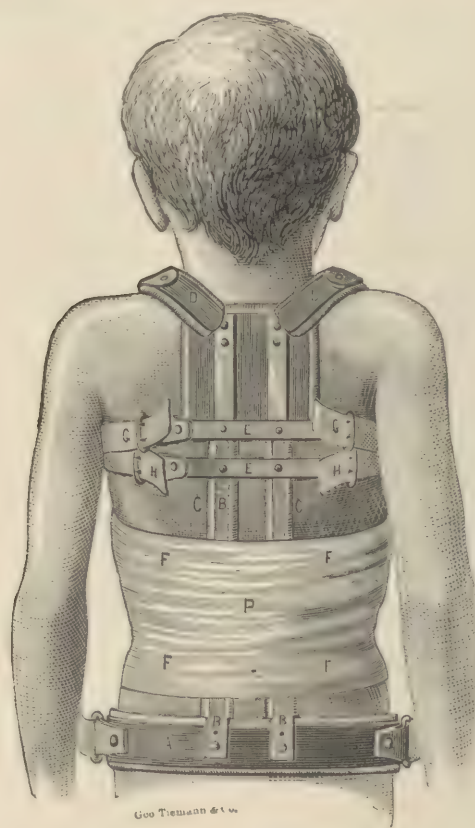
SPINAL DISEASES AND DEFORMITIES.

Caries, Spondylitis, Angular Curvature, Pott's Disease.

FIG. 4145.

Shaffer's Plaster Zone Apparatus.

FIG. 4146



"Figs. 4145 and 4146 represent this apparatus. It consists of two perfectly plain uprights of annealed bar steel, *B, B*, riveted to the hip band, *A*, with cross-pieces, *E, E*, and shoulder-pieces, *D, D*. There are no 'pad plates,' or 'cork,' or 'hard rubber' pads, no 'hinges' or 'screws,' as in the Taylor spinal brace, from which this apparatus is modified. *F, F, F, F*, represents a zone of plaster of Paris applied around the body and covering the uprights. *P* is opposite the deformity. The pads, *C, C*, are simple rolls of canton flannel, stitched to the uprights by transverse stitches, as shown in the engraving.

"Fig. 4145 shows the anterior appearance of the apparatus. *J* is a padded webbing strap, which buckles at *G, G*, in Fig. 4146. *F, F* (Fig. 4145) are two axillary straps, which are buckled to the shoulder pieces, *D, D* (Fig. 4146). *L* (Fig. 4145) is a padded pelvic strap, which is inserted at either end in the buckles on hip band, *A*. *K* (Fig. 4145) shows the anterior appearance of the plaster zone which takes the place of the yielding 'apron' of the Taylor spinal brace.

"To apply this apparatus, the patient is placed upon two tables of equal height. The tables are then separated so that the part that is to receive the plaster zone shall be easily accessible from all sides. The head of the patient being grasped by one assistant, and the thighs by another, gentle but steady traction is made, while the operator, using a couple of monkey wrenches, bends the straight uprights to correspond with the outline of the transverse processes. The canton flannel pads are now sewed on and the apparatus is laid on the back. The pelvic and thoracic straps are tightened; a strip of canton flannel is passed around the body, covering the deformity; traction is steadily made, and, by means of the plaster roller bandage, ordinarily prepared, a zone of plaster is snugly applied, covering only two or three vertebrae above and below the diseased bones."—NEWTON M. SHAFFER, M. D.

MEASUREMENTS REQUIRED.

- | | |
|---|--|
| 1. Shaffer's Spinal Apparatus for Plaster Zone. | 3. Circumference of chest, Inches. |
| 2. Length of uprights, Inches. | 4. Circumference of pelvis, " |

ORTHOPÆDIC.

SPINAL DISEASES AND DEFORMITIES.

Posterior Curvature Braces.

FIG. 4147.—With straps removed.



Stillman's Improved Lever Brace.

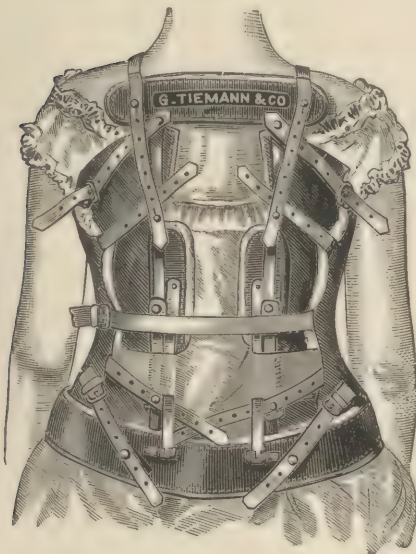
FIG. 4148.—Anterior view.



FIG. 4149.—Posterior view.

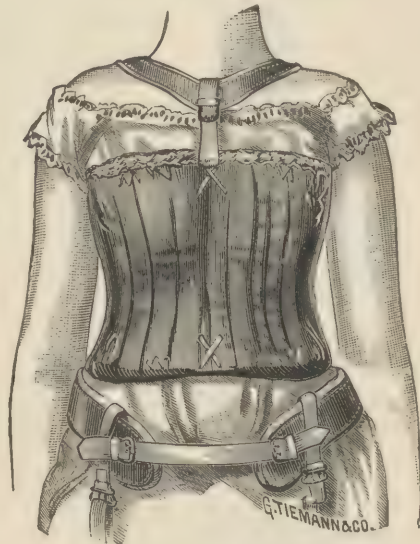


FIG. 4150.—Posterior view.



With Corset.

FIG. 4151.—Anterior view



Measurements required
are the same as
directed on page 688.

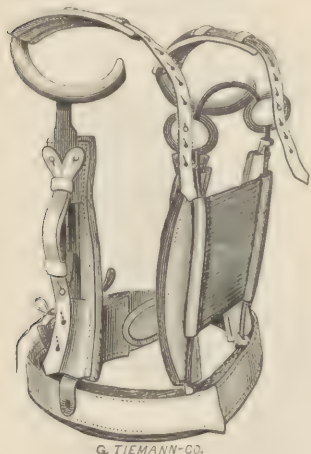
"The brace is constructed so as to embody a lever with a short and a long arm; the short arm extending from the site of the disease to the sacrum, and the long arm from the neck to the sacrum—the two being there connected by an adjustable clamp, and together forming a V-shaped lever, which automatically acts to press forward the deformity and yet holds the spine firmly in the erect position. The force is so graduated that, if leaning forward is attempted, the shorter arms press firmly over the transverse processes adjacent to the kyphos, and exert a forward pressure which prevents the spine yielding at the seat of disease.

"Nature's indication for the treatment of Pott's disease is to put a splint on the back of the patient which will maintain this erect position; for, since the tendency of the disease is to curve the affected portion of the spine forward, the centre of this curve being anteriorly, our corrective force should be applied to produce exactly an opposite curve to the diseased one, the centre of such a corrective curve being posterior to the column. In other words, we must follow nature's lead and hold the spine erectly and slightly curved backward."—C. F. STILLMAN, M. D.

ORTHOPÆDIC.

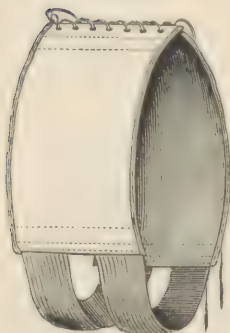
SPINAL DISEASES AND DEFORMITIES.

Posterior Curvature Braces.

FIG. 4152.—Tiemann & Co.'s
Brace for Posterior Curvature.

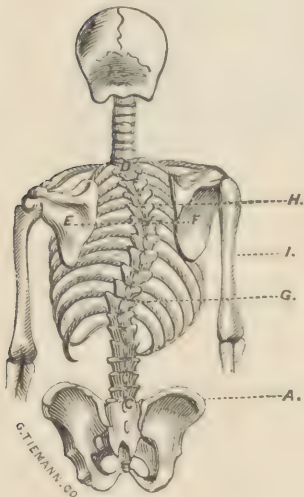
G. TIEMANN & CO.

FIG. 4153.



G. TIEMANN & CO.

FIG. 4154.



G. TIEMANN & CO.

To overcome the objections to all forms of instruments formerly employed for the correction of spinal curvature, which were heavy, unyielding, limiting muscular motion, and in many cases entirely suspending it, subjecting the patient to the greatest inconvenience without compensating results being obtained—we, many years ago, constructed braces which possess all the requirements of mechanical aids in the successful treatment of spinal distortions, however induced. They are light, airy, easily adjusted, and afford the patient comparative freedom of motion along with adequate support.

The brace (Fig. 4152) is intended to afford an entirely elastic continuous and gentle pressure to the parts to which it is applied, giving to the patient, along with adequate support, an easy and comfortable feeling. It is made of light tempered springs and softly padded wherever it comes in contact with the body.

The steel belt below passes around the pelvis, and the principal weight is thrown upon the gluteal region. The front portion is broad, so as to compress the protruding abdomen. Two upright parallel bars pass on each side of the posterior elevation having a portion of silk elastic rubber between them, which gives a constant pressure upon the protuberance. If the latter is inflamed, a portion cut out of the elastic material prevents direct pressure upon the bone. Upon these side bars are attached two elliptic and padded springs, yielding to every pressure, and adapting themselves to the sides of the spinal column and keeping the body in an erect position. These are removed or applied by a very simple process. The two padded crutches are elastic and elevate the body by pressing mostly under the margin of the scapulæ, thus obviating any tendency to pressure upon the axillary veins. They are constructed in such a manner that the equilibrium of the body can be restored in case one shoulder is depressed.

The elastic belt shown in Fig. 4153 is for the purpose of giving additional pressure, if needed, but mainly to compress the sternum, which generally protrudes. It is also designed to be worn at night when the apparatus itself is not applied. The brace was first noticed in the *New York Medical Record*, August 1, 1868, since then very many of them have been applied, and have given general satisfaction, as well to the patients wearing them as to the physicians by whose orders they were made.

DIRECTIONS FOR MEASUREMENT.

1. Tiemann & Co.'s Brace for Posterior Curvature.
2. Patient's name (or sex).
3. Patient's age.
4. Patient's weight (estimated).
5. Distance from sacro lumbar articulation to vertebra prominens (C to D), Inches.
6. Distance from sacro lumbar articulation to first vertebra involved (C to G), "
7. Distance from sacro lumbar articulation to last vertebra involved (C' to D'), "
8. Distance from crest of ilium to axilla, right side (A to H), "
9. Distance from crest of ilium to axilla, left side (A to H), "
10. Distance from the centre of one scapula to the centre of the other (E to F), "
11. Horizontal (transverse) diameter of the protuberance (H), "
12. Circumference of chest under axilla, "
13. Circumference of pelvis one inch below the iliac crests, "

ORTHOPÆDIE.

SPINAL DISEASES AND DEFORMITIES.

Cyphosis, Posterior Curvature.

FIG. 4155.—Cyphosis.



"*Κυφωσις*, the variety of spinal deviation sometimes described under the name of excurvation, gibbosity or cyphosis—terms all more or less expressive of the nature of the deformity—is met with chiefly in young and elderly subjects, although it may take place at any period of life, as well as in both sexes, and in persons of every grade and occupation. The curvature, generally situated in the upper portion of the dorsal region, varies in degree from the slightest alteration of the natural form of the column to the most hideous deformity. Cyphosis of the lumbar and cervical regions is infrequent. Occasionally an instance of general cyphosis is observed, the whole column presenting an arched appearance with marked concavity in front. Among the more common and efficient of the causes are rapid growth of the body, imperfect assimilation, spanemia, syphilis, rheumatism, scrofula, softening of the osseous tissue, and the waste consequent upon protracted and exhausting maladies. Certain trades and occupations, requiring a stooping posture, belong to the same category. Whenever, from these or from any other agencies, the spine is materially weakened, the weight of the head and the irregular action of the muscles will readily draw the vertebræ out of their normal relations, and thus occasion a corresponding degree of distortion. Hence, posterior curvature is very common among tailors, shoemakers, engravers, scribes, and persons of similar pursuits. The careless manner of leaning over books, and of sitting upon backless benches at school, with the shoulders and arms hanging forwards, is a frequent source of cyphosis.

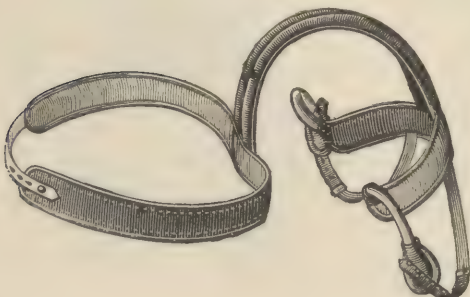
Treatment.—In the treatment of this affection, three leading indications must steadily be kept in view: 1. The removal of the exciting cause; 2. The amendment of the general health; and, 3. The proper support of the weakened spine. Dry frictions with the salt towel will be advantageous. Exercise should be taken daily in the open air, in pleasant weather, but never carried to fatigue. The patient, when in the house, should recline much of the time upon his lounge, being particularly careful to avoid everything like a strain upon the muscles of the spine.

Apparatus.—The most important elements in any contrivance for support are, lightness and strength, accurate adaptation to the surface of the body, and concentration of pressure at the seat of curvature. The pressure must be regulated with the greatest care, and should be as gentle as is consistent with the requisite degree of support. The surface of the lounge or bed upon which the patient rests should be soft, elastic and uniform. No pillow should be used. The posture may be varied from time to time, from the back to the side, or from the side to the abdomen, as may be most agreeable."—"System of Surgery." Gross.

"Should pressure of any kind be made, either upon or above the centre of the curve, the deformity would be increased. But if the support is placed at least two vertebræ beneath the axis of distortion, then expansion of the extremities of the curve may be secured, and consequent depression of its arc."—HEATHER BIGG.

Round Shoulders. Braces.

FIG. 4156.—Nyrops' Spring Brace.



"The most frequent condition is one of general impairment of muscular tone, the head and upper spine gravitating forward as the muscles yield, until the posterior ligaments are elongated and the anterior margins of the intervertebrated disks narrowed by compression. The indications are to correct the deformity by the use of braces, and to increase the tone of the muscles, the nutrition of which is impaired. To meet the former, in mild cases, a double elastic brace, such as shown (Fig. 4156), will be sufficient. Massage, electricity, tonics, and out of door exercise are also essential features of treatment."—"Text Book on Surgery." Wyeth.

ORTHOPÆDIC.

SPINAL DISEASES AND DEFORMITIES.

Cyphosis, Posterior Curvature, Round Shoulders, Braces.

Unconfined spinal curvature, or "round (stoop) shoulders," in children and youths, brought on by a habit of stooping or constant bending forward of the head and neck over books or desk, is amenable to mechanical treatment. For slight cases elastic shoulder braces, represented in Figs. 4157 and 4158, are used. These serve as a constant reminder to keep straight. For more advanced curvatures the steel back shoulder brace (Figs. 4159 and 4160) are suitable.

FIG. 4157.

Elastic Shoulder Braces.

FIG. 4158.

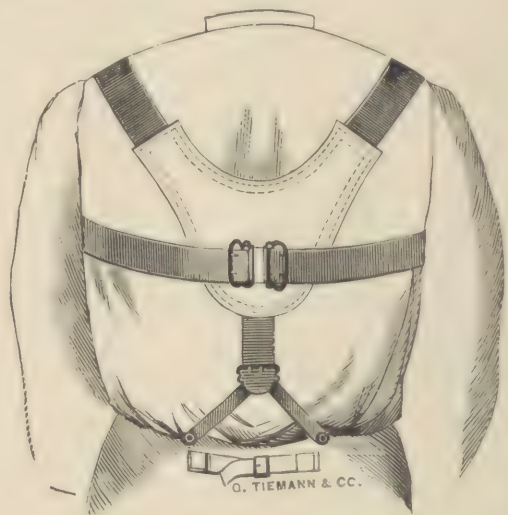
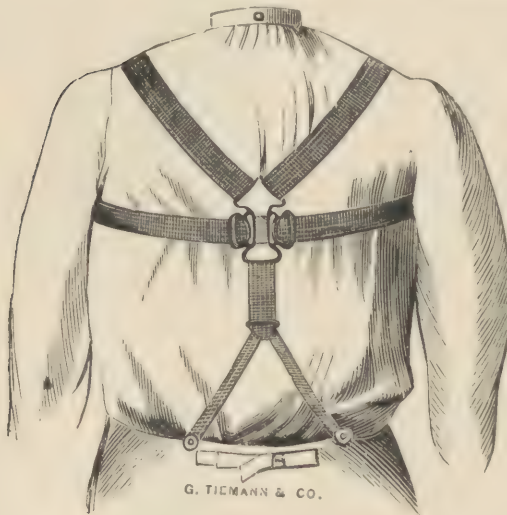
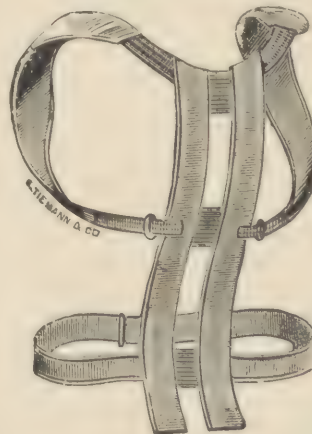
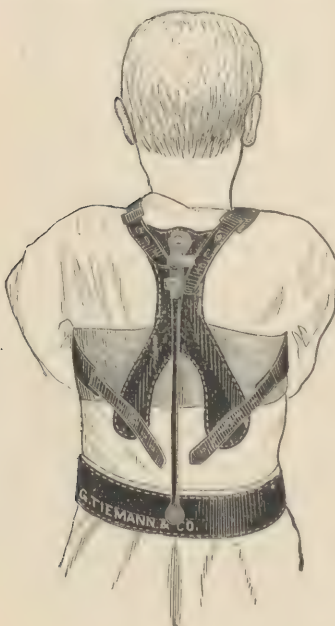


FIG. 4159.—Steel Back Shoulder Brace.

FIG. 4160.
Stillman's Cyphosis Brace, back.FIG. 4161.
Stillman's Cyphosis Brace, front.

DIRECTIONS FOR MEASUREMENT.

1. Patient's name (or sex).
2. Elastic, or Steel Back Brace.
3. Crest of ilium to axilla.
4. Circumference of pelvis.
5. Circumference of chest under axilla.

ORTHOPÆDIC.

SPINAL DISEASES AND DEFORMITIES.

Cyphosis, Antero-Posterior Curvature, Braces.

"Fig. 4160 is a posterior view of Stillman's cyphosis brace. A rotary clamp is shown just below the antero posterior clamp; this is used if any lateral rotation of the vertebræ coëxist. Fig. 4161 shows the same brace anteriorly. These braces are used for caries of the lower dorsal and upper lumbar region."—"Clinical Lecture on the Mechanical Treatment of Pott's Disease." Chas. F. Stillman, M. D. 1885.

FIG. 4162.
Stillman's Antero-Posterior Brace.

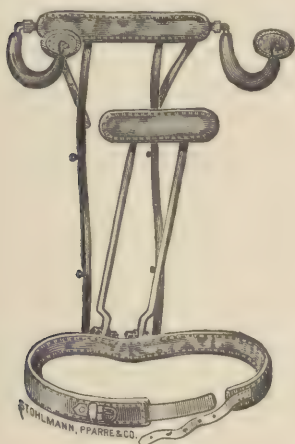
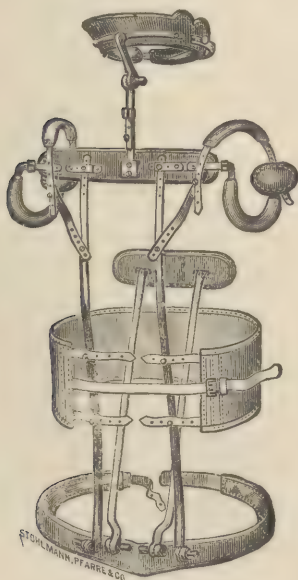


FIG. 4163.
Stillman's Antero-Posterior Brace,
with Head Rest.



"Round Shoulders, or Antero-Posterior Curvature.—The most common cause to which this deformity can be ascribed is muscular weakness, the inability of the back to recover the erect position after it has been relaxed. Relaxation of the back is the position of rest assumed by the trunk when the superincumbent weight is to be more fully borne upon the bodies of the vertebræ, and we then rely upon the ligamentous bands and attachments rather than muscular force to keep the body in this less fatiguing position; thus relieving the muscles from all necessity of the contraction which is required if the trunk be maintained erectly. In this position of rest the spine curves backward in the shape of a bow, from the sacrum to the head, the centre of the bow being in the middle dorsal region, the bodies of the vertebræ being crowded together throughout the whole extent of the spine and the muscles not exerting their contractile force.

"When the erect position is again assumed, the muscles should restore the normal spinal curves, so that the head and upper portion of the trunk, with their appendages, become supported in the proper line of direction. But if the muscles lack tone or are fatigued, or the patient is indolent, the position of rest becomes habitual and we have production of round shoulders as a result."—C. F. Stillman, M.D., in *Medical Record*, August 25, 1883.

"Such cases require a brace which will act supplementary to the impaired muscles of the back, and in applying one we must remember that this class of deformities are unattended by pain, the desire for symmetry bringing the patient to us, so that naturally an unsightly apparatus would be objected to.

"My brace is composed of a light double pair of springs. The under springs are somewhat shorter and are provided with a pad at their extremities for pressure on the dorsal region when the brace is applied. By means of ratchets the power of the springs is regulated. To make the brace effective, the curves of the under springs are made the reverse of the curves of the deformity. Thus the curve of the deformity and the curve of the combating springs are so placed in contact with each other that, when the brace is applied and the springs are drawn tightly towards each other, reduction in the exaggerated curves of the spine results. Fig. 4163 shows the adjusting straps and belt, also a head-rest which I sometimes add to this brace. These braces are a modification of those described in the *Medical Record*, August 25, 1883."—C. F. STILLMAN, M. D.

MEASUREMENTS REQUIRED:

1. Sex of patient.
2. General appearance of patient.
3. Lay a soft piece of lead wire along the back, moulding it exactly to the spine, from the seventh cervical vertebra to the middle of the sacrum. With this pattern trace carefully the shape of the spine on a sheet of paper, marking the points opposite the upper and lower borders of the scapula and the crest of ilium.
4. Circumference of body between crest of ilium and trochanter major, Inches.
5. Circumference of body at waist, "
6. Circumference of body under axillæ, "
7. Distance between the upper borders of the scapulæ, "
8. Distance between the lower borders of the scapulæ, "

ORTHOPÆDIC.

SPINAL DISEASES AND DEFORMITIES.

Lordosis, Anterior Curvature, Braces.

FIG. 4164.—Lordosis.



"Another variety of distortion is an abnormal arching forwards of the loins. This kind of curvature frequently coexists with a bend of the whole course of the spine, the column forming a long arch with a deep hollow in the loins. The technical name by which this variety of distortion is known is 'lordosis.' Traction of the longissimus dorsi and sacro-lumbalis muscles, or a wasting of the lumbar intervertebral cartilages on their posterior surfaces, are the principal causes of the condition. Each may exist apart from the other, or both may be found combined; the latter being the most common occurrence. Patients who suffer from this form of spinal distortion find it extremely difficult to walk or stand without throwing the abdomen forward in an unnatural and inelegant manner. The shoulders are generally rounded."—"Orthopraxy." Heather Bigg.

"Anterior curvature, 'lordosis,' or 'sway back,' is far less frequent than cyphosis. It occurs almost always in the lumbar region. In the later months of pregnancy it is a common condition, and is met with in individuals with unusual development of the stomach and abdominal viscera, or in cases of chronic abdominal tumor (fibroid, &c.)"—WYETH.

"The treatment of this variety of spinal distortion must be conducted upon the same principles as that of posterior curvature. The pressure must be made to bear more particularly upon the abdomen and the lower portion of the chest in front, and upon the back and pelvis behind. A piece of elastic webbing will be found of great service in equalizing the compression of the abdomen, a matter of no little moment in regard to the comfort of the patient, as well as to his ultimate recovery. When the curvature involves the cervical region, proper attention must be given to the support of the head."—"System of Surgery." Gross.

FIG. 4165.—Porous and Russia Felt Jacket.



FIG. 4166.—Smith's Corset, with Serpentine Springs.

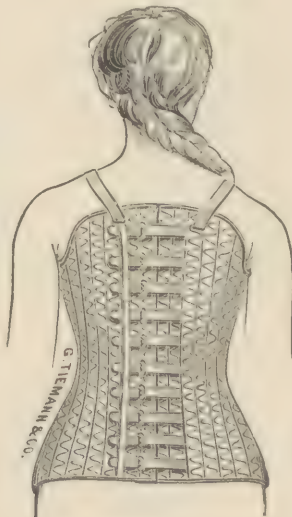
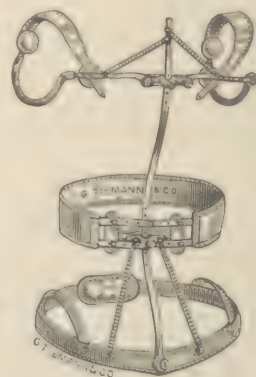


FIG. 4167.—Delicate Brace for Anterior Curvature.



An order for brace (Fig. 4166 or 4167) must be accompanied by measures as directed on page 688.

"Felt Jackets are applicable to either lateral, posterior or anterior curvatures. Any portion of the jacket can be made quite soft, so as not to press on projecting parts of the spine, hips or breasts. The advantages are lightness, ease, rigidity, facility of removal for ablution, exercise, &c., economy—the same jacket being capable of remoulding as the case progresses.

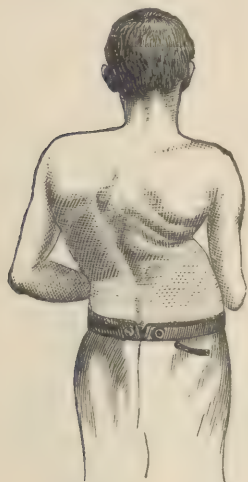
We need a mould made as follows: A plaster of Paris jacket is applied, and as soon as this hardens, it is split down in the median line in front, removed from the body, and the cut edges placed and held in apposition by a bandage carried around and over the entire jacket. This shell is greased on its inner surface, placed upon the floor, and filled with stiff plaster mortar. When this hardens, the shell is removed, leaving an exact cast of the thorax, upon which the jacket is to be built.

ORTHOPÆDIC.

SPINAL DISEASES AND DEFORMITIES.

Scoliosis, Lateral Curvature.

FIG. 4168.—Scoliosis.



"In lateral curvature, the *scoliosis* of the older authors, the deviation of the spine is to one side, and is essentially due to irregular muscular contraction, acting upon weakened bones, fibro-cartilages and ligaments, and dragging them out of their natural position in such a manner as to induce more or less deformity. The side most commonly affected is the right, for the reason, probably, that most persons use the right arm much more than the left. Of five hundred and sixty-nine cases of lateral curvature treated at the Royal Orthopædic Hospital of London, four hundred and seventy were in this situation.

"The *causes* which give rise to this irregular action on the part of the muscles may be conveniently arranged under the following heads: 1. Affections of the muscles, as hypertrophy, atrophy, inflammation and spasmodic contraction; 2. Debility, either general or local; 3. Obliquity of the pelvis from injury, disease, or malformation of the inferior extremities; 4. Altered capacity of one side of the chest, causing increased action of the muscles of the opposite side; 5. Rachitic softening of the bones; 6. Defective development of the vertebræ.

"Lateral curvature, in its more aggravated states, is always attended with marked rotation of the bodies of the vertebræ, through which the spinous processes are directed towards the concavity of the curvature; the vertebral column is diminished in length in a degree proportionate to the lateral deviation, and the chest is materially altered in its figure—the ribs being flattened, elongated and twisted, and the sternum and costal cartilages tilted prominently forwards and depressed towards the pelvis. The scapula on

the side corresponding to the convexity of the thoracic curve is unnaturally full and elevated; its upper border is directed forwards and inwards while the inferior angle is carried outwards, and hangs off in a very unseemly manner from the side of the chest, in consequence either of the elongation of the latissimus muscle, or on account of the bone from beneath its surface.

"Considered as a morbid affection, lateral curvature is most commonly observed in young girls, from the age of five to fifteen or eighteen, especially in such as are naturally of a feeble constitution, or whose health has become early impaired by want, exposure and imperfect nutrition."—"System of Surgery." Gross.

"The treatment of rotary lateral curvature must be governed by the cause which has produced the deformity and the condition of the patient when first brought under notice. If the distortion be dependent upon obliquity of the pelvis, caused by inequality in the length of the lower extremities, or owing to congenital malformation, or to disease of the joints, or fracture, thus causing obliquity of the pelvis, the shortened limb must be artificially increased sufficiently to equalize the length of the two limbs before any other treatment can be effectual."—SAYRE.

"Lateral curvature of the spine, contracted by girls at school and by children at factories, from a vicious habit of sitting, standing or reclining, by which the vertebral muscles lose their equilibrium, can only be successfully cured by a reference to the nature of the exciting cause. The awkward and constrained position must be promptly rectified and means adopted to improve the general health, when this has been suffering, by gentle exercise in the open air, sea-bathing, the cold shower-bath, and a properly regulated diet. Great attention must be paid to the gait in walking, so as to bring into full play the enfeebled and faulty muscles; the spine should be well supported while in the erect posture by a light and well-adjusted appliance, and the child should lie down frequently during the day, in order to afford complete relaxation and rest to the entire system, so conducive to comfort and the restoration of vigor."—GROSS.

"When the lumbar division of the spinal column is the primary seat of the deformity, material benefit may be derived from the sloping seat of Barwell, which, by lifting the depressed side of the pelvis, tends to throw the curvature into the opposite direction. This action is well shown in Fig. 4169, the deformity, represented by the dotted lines, having been almost rectified by the seat, which inclines from the convex to the concave side of the curvature. As soon as the lumbar muscles in the latter situation have become sufficiently strong, the same principle may be carried out by adding a cork sole to the shoe corresponding to the convexity of the curvature. The form of support adopted by Barwell in which gentle elastic force is employed in the direction of the radii of the curves is shown in Figs. 4170 and 4171. A band passing around the upper part of the thigh supports a pad of thin sole leather or couil on the hip, from the two upper angles of which a band of webbing, broadest over the most prominent portion of the curve, is carried around the loins. In front the band is rendered elastic by the insertion of strong india rubber. In the event of the compensating dorsal curve being well marked, or of the support exhibiting a tendency to slip, a second elastic band, indicated in the cut by the dotted lines, is passed in front and behind the body to a pad placed opposite the most prominent portion of the dorsal curve, and retained in position by a shoulder strap. In primary dorsal scoliosis the best position is that which places the great serrated muscle on the side of the curvature at rest, and at the same time renders its in-

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Scoliosis, Lateral Curvature, Braces, Suspension.

active opponent tense. These objects may be accomplished by directing the patient to carry the arm which corresponds to the deformity habitually in front of the body, so that the hand shall rest on the opposite side of the waist, and the opposite arm behind the waist."—"System of Surgery." Gross.

FIG. 4169.
Barwell's Sloping Seat.



FIG. 4170.
Barwell's Scoliosis Brace.



FIG. 4171.
Barwell's Scoliosis Brace.



FIG. 4172.—Self Suspension.



"Rotary-lateral curvature of the spine may be corrected before the bones, ligaments and ribs become fixed in their abnormal position; but, when that has occurred, the deformity will be permanent. It is important, therefore, to be able to recognize the deformity in its earliest development.

"*Symptoms.*—One of the earliest symptoms is an undue prominence of one of the scapulæ. If, therefore, this be present, always examine the spine; but, even at this stage of the deformity, if a curve is found, if you will remove the weight of the head and shoulders from the spinal column, by placing your hands in the axillæ and lifting the patient up, the curve will entirely disappear; or, if the patient is laid face downward upon a table, the spine will be found to be perfectly straight, or can be made so by a trifling amount of extension. But, if the patient stands *without support under the arms*, you can, by carefully noting the situation of the spinous processes (which can be done conveniently by rubbing the finger over them, thus producing a reddish line, or by dotting them with ink), detect a curvature, very trifling it may be, in the dorsal region.

"Now, if the deformity is permitted to go uncorrected, it will gradually increase as the spine yields to the muscular contractions assisted by the weight of the head and shoulders, until finally, as the body sags over, it is fully developed. The deformity does not advance far in the dorsal before a compensating curve is developed in the lumbar region.

"*Treatment.*—The use of all *fixed* apparatus in the earlier stages of all deformities where we wish to restore lost muscular power is positively injurious. The principle which should guide us is, *to place upon the stretch those muscles which have been inactive and relaxed, and approximate the origin and insertion of the muscles we wish to remain quiescent.* * * * Every effort should be made to develop the enfeebled muscles by repeated but limited exercises, care being taken at all times to avoid over-fatigue, and at the same time to limit the action of the over-developed muscles as much as possible. Self-suspension, as recommended by Dr. Benjamin Lee, by climbing

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Scoliosis, Lateral Curvature, Suspension, Sayre's Jacket.

FIG. 4173.
Self Suspension.



up a rope which passes over a pulley and is attached to straps passing under the chin and occiput of the patient, is especially to be recommended. Great care should be taken that the hands be kept above the head, and the patient should reach one hand slowly over the other, until the heels are just raised from the floor; when the patient has elevated the body to the highest point desired, the uppermost hand on the cord should always be the one upon the side of the concavity of the dorsal region. While he is in this position, the great thoracic muscles—the pectoralis major, latissimus dorsi, serratus magnus, &c.—are brought into play, and the ligaments of the neck are relieved of the greater part of the strain. If the hands are allowed to descend below the level of the head while the patient is self-suspended, there will be a risk of too much strain being thrown upon the ligaments of the neck, and consequent serious damage. During self-suspension some one should always be at hand, especially if the patient be a child, to guard against the twisting of the rope and to see that the exercise is properly performed. The immediate result of self-suspension, produced by the above-described means, will be a diminution of the abnormal spinal curves (primarily and secondarily), increase in the girth of the chest and a decrease of that in the waist. These exercises should be performed twice a day at first, making three full inspirations at each suspension, and repeating these suspensions three separate times at each *séance*; the number and length of time of exercise can be increased as the physician thinks requisite.”—“Orthopædic Surgery and Diseases of the Joints.” Lewis A. Sayre.

Sayre's Plaster of Paris Jacket for Lateral Curvature.

* * KNITTED SHIRTS, OF ALL SIZES, ON HAND AND MADE TO ORDER.

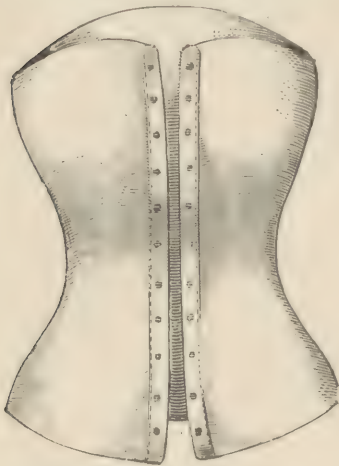
“Application of the Plaster of Paris Jacket in Lateral Curvature.—The patient is to be fitted with a knitted shirt—the same as in the application for spondylitis—with the exception that it is made twice the length, for the purpose of being reversed on the outer side of the jacket and made into a corset; in cases where the patient is a female, pads of proper size are then placed over the mammæ, according to the development of the patient, and the shirt then tied tightly over the shoulders. The patient then suspending herself, the shirt is to be pulled down snugly by an assistant, the dinner pad not being used in lateral curvature, a full meal being taken before the application of the jacket. The plaster bandage then being immersed in water sufficient to cover it when standing on its end, is left until all gas has escaped; a second bandage is then placed in the water, and, the first one being removed and the surplus water pressed out of it, is then applied snugly around the waist, each turn of the bandage covering two-thirds of the one previously applied; it is carried in this manner down below the crests of the ilia; then, passing back, up toward the thorax and over the mammæ; an assistant rubbing each turn of the bandage into the one previously applied, until a sufficient thickness has been secured to give the necessary support to the patient, which varies according to the size of the patient; the adult not requiring more than the thickness of the bookbinder's pasteboard. In a few minutes the plaster is sufficiently set to allow of the removal of the jacket; this being effected by a section made from the centre of the sternum to the centre of the pubes, using a sharp curved knife for the purpose, dividing both shirt and plaster dressing; the jacket being taken off while the patient still retains the suspended position. In cases of persons who are very obese, a small strip is cut out of the centre of the jacket in order that it may be drawn in at the waist; but in the majority of cases this is not exquisite. On the removal of the jacket the edges are brought closely together, and a roller bandage passed around it in order to retain its shape; it is then placed before the fire until thoroughly hardened, which occupies generally about twenty-four hours. The following day the patient suspends herself as before, but having on at this time a thin under-vest; the jacket is then opened and sprung around her, and fitted into the exact position in which it was first applied; it is then secured by passing a roller bandage around the waist, making also a few turns of the bandage above and below the waist. The patient is then removed from the suspending apparatus, and the jacket cut out under the arms on either side until she is perfectly comfortable, so that no pressure is made in the axillæ, and the shoulders are not elevated by the jacket; the patient is then allowed to sit down and flex the limbs, the lower part of the jacket being trimmed sufficiently to admit of free motion of the limbs. The jacket is then removed and sent to the instrument maker, where the shirt is reversed and stitched at the top, cutting off all super-

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FIG. 4174.—Sayre's Plaster Jacket, for Lateral Curvature.



fluorous material; strips of leather arranged with eyelet-hooks are then sewed down the front of the jacket for the purpose of lacing it; thus forming a complete corset, this being worn during the day and always removed at night; the patient taking the gymnastic exercises previous to the application of the jacket in the morning and after its removal at night. The patient is to be self-suspended in the morning, before the application of the jacket, in order that it may be properly adjusted while in the extended position.

"Many persons are still under the impression that the application of the plaster of Paris jacket in lateral curvature is for the purpose of effecting a cure, and to be worn as a permanent jacket, as in spondylitis. I wish, however, for it to be distinctly understood that the plaster jacket, in the treatment of lateral curvature, is simply an adjuvant to the gymnastic exercises so necessary for the cure of this deformity, and which are for the purpose of developing the weakened muscles upon the affected side—the plaster jacket being simply applied for the purpose of retaining the body in the improved position which self-suspension, &c., give it. Again—and to this I would specially draw attention—that the jacket is to be removed at night, and at all times when the gymnastic exercises are taken."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre.

See POROUS FELT JACKETS, Fig. 4165; see also page 682, PLASTER JACKET FOR SPONDYLITIS.

Squire's Spineyard.

FIG. 4175.—Squire's Spineyard.



"This is a new apparatus for producing extension in the treatment of spinal disease, by the plaster jacket, or in the fitting of a brace. The plan for suspension should be vertical and one that will admit of graduating the amount of extending force to the toleration of the patient. I have found that my patients can endure a force equal to one-third of their weight, and scarcely more than this, without its producing the unpleasant symptoms of excitement, fainting, vomiting and cramps, the occurrence of which has too often curtailed the time desired for applying a jacket.

"In order to carry out this principle I use an apparatus which consists of a horizontal bar supported at its centre from the ceiling. At the extremities of this bar are loops or attachments for the hands of the patient, and pulleys for the cords which support the seat. In the seat at each end is a pulley, also for the cords to play over. These cords, two in number, are attached by one end to the horizontal bar, and, after including the system of pulleys, are fastened by the other end to the usual head gear, as may be better understood by referring to the accompanying illustration.

"In the use of this swing, the patient must be able to reach the handles with his hands while his arms are at right angles with his body. The head gear must be adjusted about the chin and occiput; then, by lifting himself clear from the floor by his hold on the handles, he can seat himself in the swing; removing his grasp now from the handles, one-third of the weight comes upon the chin and occiput, while the remaining two-thirds, which practically is found to have been a dead weight, is supported by the seat of the swing.

"I may add that by this process the spine will be simply straightened and not stretched. Measurements taken before and after treatment by this mode of extension and the application of the plaster jacket have shown an increase

in height for the patient of over an inch in a recent case. Every time a jacket is applied it is attended with a little increase in height over the former measurement, while the extending force is every time the same, but a far greater advantage is obtained in the length of time the patient can remain suspended, which may be, as some have expressed it, for an hour at a time."—C. L. Squire, M. D., in the *Albany Medical Annals*.

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Scoliosis, Lateral Curvature, Braces.

FIG. 4176.—Tiemann & Co.'s Scoliosis Brace.

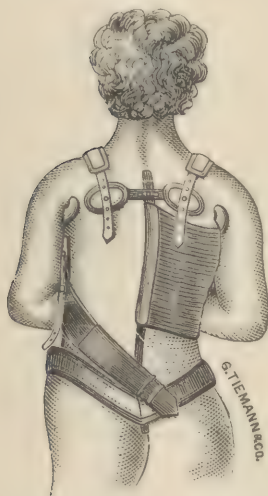
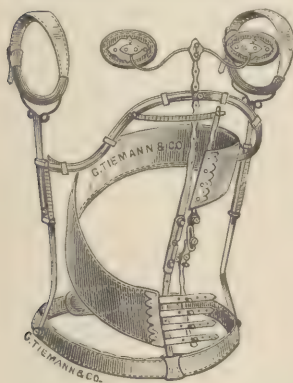


FIG. 4177.—Tiemann & Co.'s Scoliosis Brace, extra fine.



These braces are constructed on the same principle as those shown on page 688. We have applied many of them since they were first noticed in the *Medical Record*, August 1, 1869, and they have given general satisfaction. They are made as follows:

To a pelvic band are attached laterally two elastic crutches to relieve the spine of the weight of the trunk. By means of lateral straps the crutches can be elongated, so that by raising the one on the concave side *higher* than the one on the opposite, the restoration of the equilibrium of the body is aided. Posteriorly a single strong upright bar is riveted to the pelvic band. This bar is provided with a couple of adjustable pads for the scapulæ, and, below these, with a number of buttons, to which is attached a strong belt of proper formation, made partly elastic. This belt is passed around the protuberance obliquely forward, over the compensatory curve on the other side, and buckled to the pelvic band behind. It will be found to exercise a gentle but continuous elastic pressure, at the same time rotating the ribs around their vertebral axes, thus unfolding the helical curve.

Treatment.—Now it needs no argument to show that when a curve is the result of a disturbed equilibrium, from a too great superincumbent weight, relative or actual, or from imperfectly antagonized muscular action, a primary object should be to remove the superincumbent weight and antagonize the exaggerated muscular action. It is clear also, that, in whatever manner this object can be obtained, it will offer the most rational means for obviating the absorption of material arising from improperly distributed pressure and the retraction of ligaments and muscles. The removal of superincumbent weight and the antagonizing of exaggerated muscular traction are obviously mechanical questions; hence the treatment of spinal curvature forms in an especial manner a branch of orthopraxy.

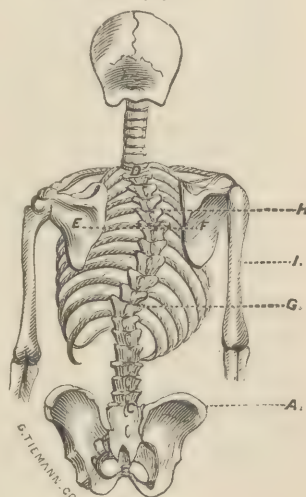
‘Experience has abundantly taught that medicine is all but powerless in distortions of the spine without mechanical aid. The most ably conducted treatment of the peculiar form of debility which may be at the foundation of the deformity is of no avail unless the mechanical requirements of the case are first attended to. Physic, change of climate, and, although in a less degree, gymnastics, are alike unavailing to unfold a confirmed curve or restore the elasticity of an impaired ligament or lengthen a retracted muscle. But if the pressure be removed from a defective vertebra and the tendency to retraction of ligaments and muscles be counteracted mechanically, then medicine, change of climate and gymnastics, by invigorating the debilitated parts, may induce in them a healthier nutrition and enable them best to resist the tendency to distortion.’—“Orthopraxy.” Heather Bigg.

MEASUREMENTS REQUIRED.

1. Patient's name (or sex).
2. Patient's age.
3. Patient's weight (estimated).
4. Distance from sacro lumbar articulation to vertebra prominens (*C* to *D*), Inches.
5. Distance from sacro lumbar articulation to first vertebra involved (*C* to *G*), “
6. Distance from sacro lumbar articulation to last vertebra involved (*C* to *D*), “
7. Distance from crest of ilium to axilla, right side (*A* to *H*), “
8. Distance from crest of ilium to axilla, left side (*A* to *H*), “
9. Distance from the centre of one scapula to the centre of the other (*E* to *F*), “
10. Horizontal (transverse) diameter of the protuberance, “
11. Circumference of chest under axilla (*H*), “
12. Circumference of pelvis one inch below the iliac crests, “

In addition to the above measures please state if the convexity of the curve is to the *right* or *left* side. In the diagram of skeleton it is to the *right*.

FIG. 4178.



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Scoliosis, Lateral Curvature, Braces.

FIG. 4179.—Illustrating Curvature when Patient has no Support.



FIG. 4180.—Stillman's V-Lever Brace, combined with Corset (posterior view).

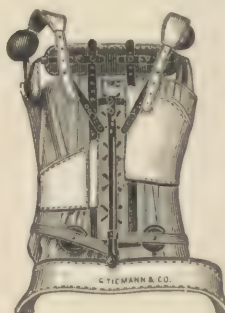
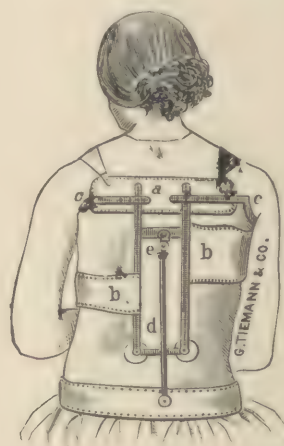


FIG. 4181.—Showing Principal Features of Stillman's Brace.



"The brace is constructed in three parts—dorsal, pelvic and cervical. The first, or *dorsal*, consists of a broad pad placed high up across the shoulders, and from this descend two metallic strips, terminating in pads in the lumbar region. From these strips the stiff metallic semi-girths (*b, b'*) pass practically around the body, the upper one being over its protuberant scapula, and the lower one carried around to press upon the protuberant ribs anteriorly. From each side of the transverse pad (*a*) pass axillary crutches (*c, c'*), terminating anteriorly in large pads which lift and press the shoulders backward without impinging or pressing upon the infra-clavicular spaces.

"The material of which these crutches are constructed is of sufficient firmness not to yield to the twisting efforts of the patient, although they may be bent into any position by the orthopædist's hands, and they serve a very important purpose in regulating the position of the shoulders and upper extremities. The dorsal portion of the brace may be incorporated into a corset if desired (see Fig. 4180), several of the straps which are used to fasten it firmly to the body being omitted in the drawing, as they might tend to confuse the reader in understanding the construction of the brace.

"The *pelvic* portion of the brace consists of a padded pelvic girth, which locks in front, is very stiff, and is attached to the dorsal portion by a long bar (*d*), which terminates superiorly in my compound clamp (*e*). This clamp has been described before in various journals, and permits the pelvic portion to be fixed at three different angles with the dorsal, to which it is attached. By it we may exercise a rotary active force, an antero-posterior force, and a lateral force—thus bringing a compound twisting force to bear upon the spine. If the dorsal portion of the brace be first securely fastened to the body and the clamp regulated properly, when the pelvic portion is secured we have the body held hypererectly, the protruding scapulae and ribs pressed upon, and the shoulders squared by an active backward latero-oblique force from which the patient cannot escape.

"The *cervical* portion is only necessary when the curvature is high, and then a chin-piece is used, attached to the dorsal portion by a bar provided with the compound clamp already described; but this portion of the brace is not shown in the drawing. In applying this brace the patient is first suspended so that the abnormal curves may be reduced as much as possible before its application. It will then tend to retain the favorable position produced by the suspension, and, indeed, improve it by means of the active twisting force it brings to bear.

"In conclusion, it is my opinion, based upon many cases of this deformity, that the best results are obtained by the conjoined use of an active brace and proper exercise upon curved frames.

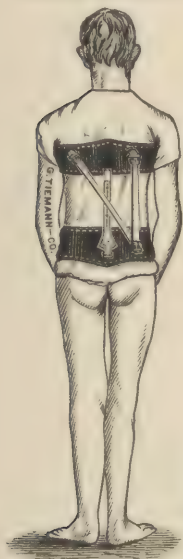
"A brace alone is of but little use, serving merely to hold the body erectly; but to exert any curative power it should be made to fit the patient accurately and be readjusted often, so as to exert its active effects through all the stages of improvement; and, in addition, the patient should be obliged to take systematic exercise, and, if necessary, should receive the benefit of massage, electricity and other tonics. The diet and habits of life should be regulated carefully, and all work avoided which tends to increase the deformity."—*The Medical Record*, May 21, 1887.

Measurements required, same as directed on page 697 for Fig. 4178.

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FIG. 4182.—Stillman's Vertical Extension Brace, for Rotary Lateral Curvature.



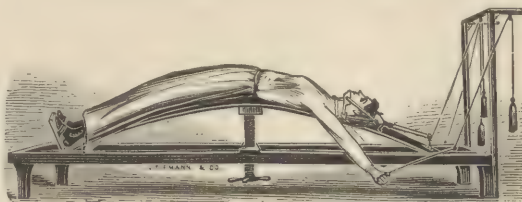
Scoliosis, Lateral Curvature Apparatus.

"But the use of a brace alone is but a small portion of the treatment of this curvature. We must also aim to strengthen the deficient muscles during such time as traction is being exerted upon the spine itself, and for this purpose the writer has recently devised two frames, which are unique and accomplish the purpose admirably with but little fatigue to the patient. The first, or vertical, frame (Fig. 4183) produces suspension on the curved board or curved traction, and while thus suspended, either partially or wholly, the patient takes arm exercises by means of the weights and pulleys with which the apparatus is provided.

FIG. 4183.—Stillman's Vertical Frame, for Backward Curved Traction during Exercise.

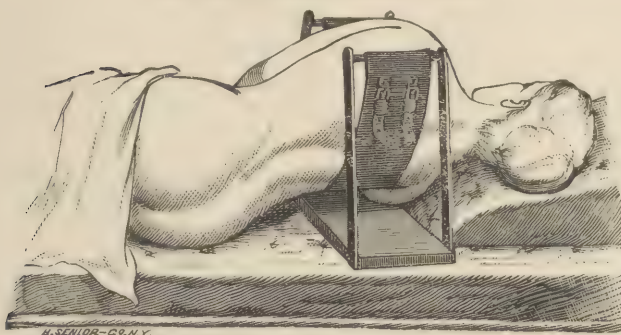


FIG. 4184.—Stillman's Horizontal Frame, for Backward Curved Traction during Exercise.



"The second, or horizontal, curved frame (Fig. 4184), produces the same results, but perhaps not to the same degree; and their conjoined use not only increases the vitality of the patient by expanding the chest and strengthening the muscles, but tends to diminish the curvature very materially. The horizontal frame is also used by phthisical patients with good effect, and also in cases of persistent backache, with or without spinal irritation."—C. F. Stillman, M. D., in *Medical Record*, May 21, 1887.

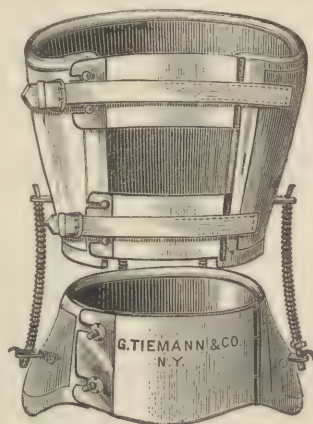
FIG. 4185.—Wolf's Spinal Cradle.



"In reclining, the body should be placed in such a position that the offending muscles are put upon the stretch. The deformity is temporarily overcome by the employment of Wolf's cradle (Fig. 4185). The belt passes over the projecting ribs and shoulder-blade, thus bringing the weight of the trunk upon these parts, while gravity aids in overcoming the curvature in the lumbar region.

"To make the segments of my jacket (Fig. 4186) removable, metallic clasps are attached to them. The clasps of the upper segment are secured in position by strong bands of elastic webbing. This arrangement permits of the necessary expansion of the thorax with each inspiration, and at the same time does not invalidate the efficiency of the support. Should there be any spinal rotation, the further advance of which it is desirable to prevent, or even overcome, this may be readily accomplished by means of one or more rubber guys passing from the summit of one steel rod to the base of another."—M. Josiah Roberts, M. D., in *Medical News*, October 14, 1882.

FIG. 4186. Roberts' Spinal Extension Jacket.



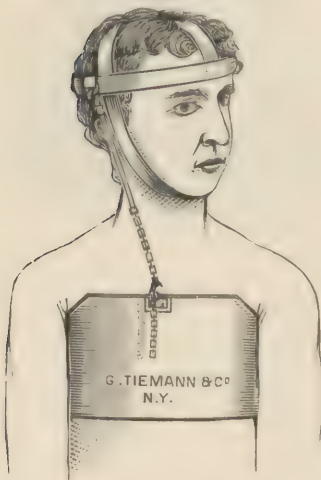
ORTHOPÆDIC.

SPINAL DISEASES AND DEFORMITIES.

Torticollis, Wry Neck.

"*Torticollis* (*torquere*, *tortum*, to twist, and *collum*, the neck), *torticolis*, *caput seu collum obstipum*, *obstipa cervix*, *cervix rigida*, *obstipitas capitis seu colli*, *trachelagra*, *entasia loxia*, *loxias*, *cephaloloxia*, *anchyloderè*, *anchyloderis*, *rhabocrania*, *rhabauchen*, *rhaboderè*, *anchenorrheuma*, *rheumatismus colli seu cervicis*, *stiff neck*, *wry neck*, (prov.) *slab*, (F.) *obstipité*.—A variety of rheumatism, seated in the muscles of the neck, which prevents the motion of the head, and causes the patient to hold it inclined to the side affected. It is, commonly, of short duration; usually disappearing in a few days. Rubefacients are the best topical applications. The term is applied to permanent contraction of the muscles of the neck, which causes the head to be held on one side. The remedy is the division of the contracted muscles."—DUNGLISON.

FIG. 4187.
Post's Torticollis Helmet.



"A case of torticollis cured by division of the sterno-cleido-mastoid muscle, followed by elastic traction of the head. Patient was affected with torticollis in a very marked degree, and has been so from his earliest recollection. His face was strongly turned towards the right side, and his left ear was approximated to the corresponding shoulder. The left sterno-cleido-mastoideus was firmly contracted, and offered strong resistance to the movement of the head in the opposite direction. Its sternal and clavicular origins were very hard and prominent.

"On the 9th of April, the patient being etherized, I performed the following operation: I made a horizontal incision, six centimetres in length, along the upper border of the sternum and clavicle, exposing the prominent tendons of the sternal and clavicular portions of the sterno-cleido-mastoid muscle. I then passed a director under each of these tendons successively, and divided them with a sharp-pointed bistoury. The division of these tendons scarcely produced any perceptible effect in liberating the movements of the neck. On careful examination, I found that there were other and deeper bands of muscular fibres, which kept the muscle in a state of tension, and which restrained the free rotary motions of the head. These bands were successively divided upon the director, and then the head could be freely moved in all directions. A few carbolized horsehairs were then laid within the wound, which had previously been washed with a carbolized lotion, 1 to 40. The edges of the incision were brought together with fine sutures.

"Before the operation the house surgeon, Dr. John A. Wells, had applied a plaster of Paris jacket around the chest, and over the right shoulder, with blunt metallic hooks over the sternum and over the right shoulder. A helmet had been constructed (Fig. 4187) under my direction, by Messrs. Tiemann & Co., consisting of a horizontal band of iron encircling the head above the ears, a vertical band of iron passing over the sagittal suture and riveted to the horizontal band in the frontal and occipital regions, and a leather strap passing transversely over the top of the head, and buckled beneath the chin. To the horizontal band of iron was attached a hook over the mastoid region, and two others, one a little before and the other a little behind that point, to vary the direction of traction, if it should be deemed necessary. This helmet was applied to the head of the patient and an india-rubber muscle, provided with a ring at the upper end and a chain at the lower, was then applied as nearly as possible in the direction of the right sterno-cleido-mastoid muscle, the ring above being hooked over the right mastoid process, and the chain below being hooked over the sternum. This was found to accomplish the object for which it was designed in a very satisfactory manner. It turned the face to the left side, and it approximated the right ear to the right shoulder.

"Two days after the operation about half of the horsehairs were withdrawn from the wound, and the remainder on the following day. There was scarcely any perceptible irritation about the wound, and union took place by first intention. The india-rubber muscle was daily removed and reapplied with such a degree of tension as seemed to be required. Passive motion of the head was also freely made in all directions. Occasionally a supplementary india-rubber muscle was applied, extending from the right shoulder to the corresponding side of the head. The patient left the hospital on the 26th of April, seventeen days after the operation, having perfect freedom of motion."—Alfred C. Post, M. D., LL. D., in "Transactions of the American Medical Association for 1880."

DIRECTIONS FOR MEASUREMENT.

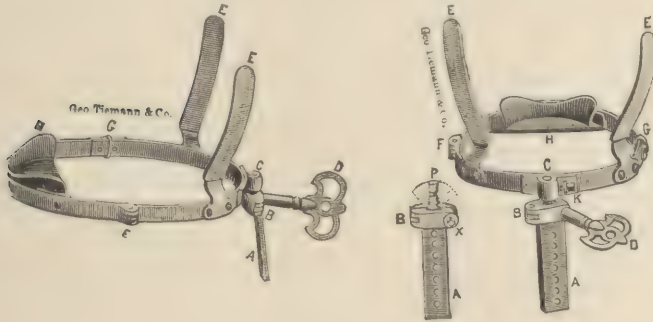
1. Post's Torticollis Helmet.
2. Circumference of Head, chin and top, Inches
3. Circumference of Head, front and back, "

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SPINAL DISEASES AND DEFORMITIES.

Torticollis, Wry Neck.

FIG. 4188.—Shaffer's Ball and Socket Pivot.



This apparatus for the treatment of malpositions of the head, shown in the engravings, consists of a pivot, *P*, which may be placed at any desired angle, either lateral or antero-posterior, and held there by a clamp which is controlled by a screw operating at *X*. The pivot fits into the chin-piece (Taylor's) at the point *C*, and, by means of the occipital uprights, *E, E*, and the chin-cup, *H*, any position of the head may be maintained and changed at will, without removing the apparatus from the patient. The key, *D*, loosens the ball of the pivot, and, the head being placed by the hand in the desired position, the

key again is used to tighten the clamp. The whole apparatus may be made to surmount the two uprights of Taylor's spinal brace or any other form of support which furnishes a reliable pedestal. The chin-piece opens at *F* on a hinge, and the slide at *G* secures the apparatus after it is applied to the head. It is an extremely useful instrument, both in Pott's disease, requiring a head support, and in torticollis.

See SAYRE'S JURY-MAST FOR CERVICAL DISTORTIONS, pages 684, 685.

FIG. 4189.

Wood's Torticollis Head-Rest.



DIRECTIONS FOR MEASUREMENT (Fig. 4189).

1. Head leans to *right* or *left* side?
2. Circumference of the neck, Inches.
3. Length of the neck at sides, from clavicle to mastoid process, "

FIG. 4191.—Richter's Torticollis Brace.

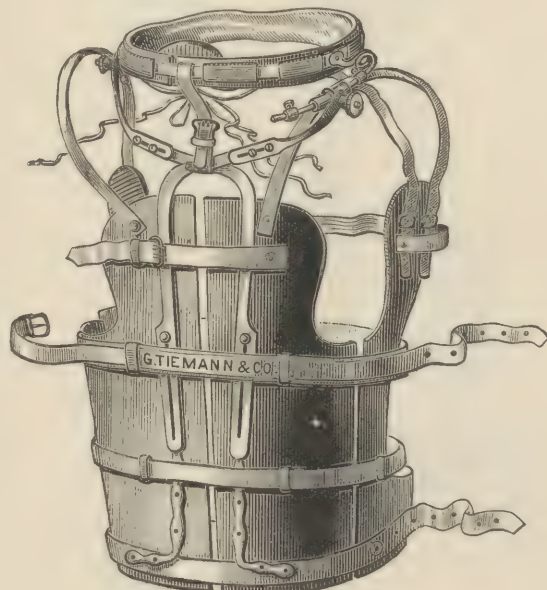
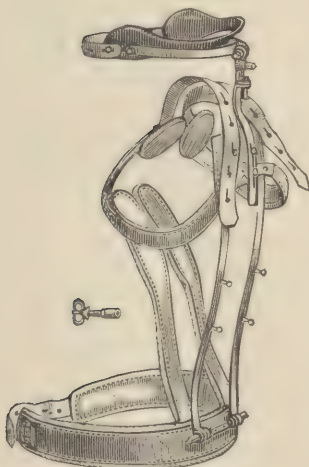


FIG. 4190.—Stillman's Lever Brace, with Attachment for Cervical Caries.

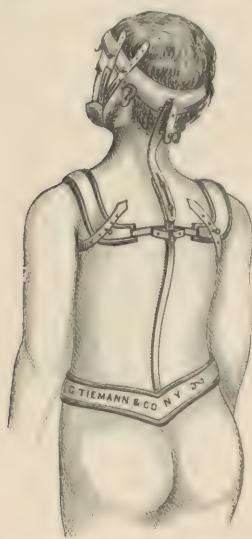


ORTHOPÆDIE.

SPINAL DISEASES AND DEFORMITIES.

Torticollis, Wry Neck.

FIG. 4192.
Markoe's Torticollis Brace.



"This apparatus is constructed in the following manner: An upright steel bar is fastened to a pelvic band, and carried along the spine to a little below the level of the shoulders, secured in position by straps passing forward over the shoulders, backward under the axillæ, and fastened to buttons or pads situated over the scapulæ.

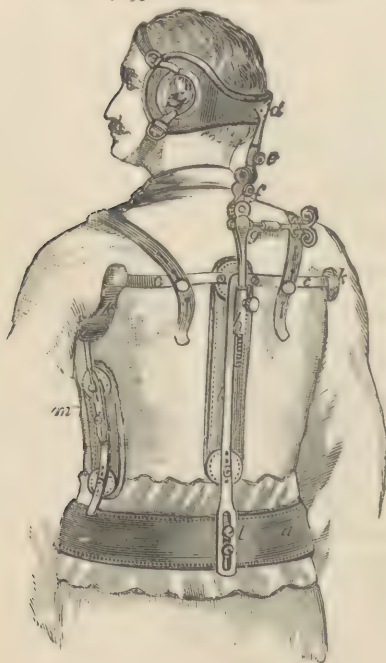
"A steel lever for extension of the neck is provided inferiorly with a slot, to admit of adjustment, and connected with the upright bar by means of two screws; the top of this lever is made to form a powerful clamp, for the purpose of holding the head-band and of securing the head in position. The head-band is formed of a steel-spring, carried half around the back of the head, softly padded, and the covering extended to the front and buckled there. A strap may also be passed across the top of the head from ear to ear.

"A bandage, the size and shape of the patient's chin, is buttoned to this head-band laterally with four straps. Fastened to the steel spring of the head-band is a steel stem about one inch or less in length, terminating in a ball; this is held within the grasp of a clamp, thus forming a universal joint, moving freely in all directions. By turning the thumb-screw with which the clamp is provided, the movement of the joint is arrested and the head of the patient may thus be fixed in any position."—THOMAS M. MARKOE, M. D.

MEASUREMENTS REQUIRED.

1. Patient's name (or sex).
2. Patient's age.
3. Patient's weight.
4. Circumference of body under axilla, Inches.
5. Distance from sacro-lumbar articulation of the spine to the vertebra prominens, "
6. Distance from the same point to the base of the skull, "
7. Distance from crest of ilium to axilla, each side, "
8. Circumference of the head at the base of the skull over the ears and upper line of the forehead, "

FIG. 4193.—Torticollis Brace.



This apparatus is principally the same as the one above. It consists of a well padded pelvic band, *a*, to which an upright steel bar is attached at *l*, passing upwards along the spine to the upper dorsal region. A cross-bar, *c*, is attached to its upper end, passing from one axillæ to the other and fastened to two crutches, *k*, fitting well under the arm. These are connected to the pelvic band by two lateral bars, *m*, which by means of a slot and screw can be raised and lowered somewhat, at will. The part of the apparatus so far described is applied firmly to the trunk by means of straps passing over the shoulder and fastened to the axillary cross-bar at *cc*. A firm hold of the head is secured by a pad, sheet steel inside, reaching almost from eye to eye backwards around the skull, with apertures for the ears and fastened to the head by straps over the forehead and under the chin. To its back part a steel bar is riveted, *d*, which connects the upper part of the apparatus with that applied to the trunk. The lower end of this steel bar is ratched and adjusted in a slide at the upper end of the steel rod, passing up along the spine and held in position by a thumb-screw shown near the letter *h*. This connecting bar is intercepted by three different joints, *e*, *f* and *g*, by which flexion can be made in any direction when worked with the key. At the joint *g*, flexion can be made to the right or left, at *f* forward and backward and at *e* rotation.

The advantage of this apparatus over many others is, that firstly a firm hold is effected to the head and trunk, and that then the head can be brought in a proper position by a true and irresistible mechanism. The apparatus when worn is almost entirely hidden under the clothing, and patients cannot very easily withdraw themselves from its action.

Measurements required, same as for apparatus Fig. 4192.

ORTHOPÆDIC.

SPINAL DISEASES AND DEFORMITIES.

Torticollis, Wry-Neck.

FIG. 4194.
Roberts' Torticollis Brace.



"This brace is for the purpose of securing, at the seat of disease, continuous elastic vertebral extension and voluntary articular motion, together with the avoidance of inter-articular pressure and friction. It consists essentially of two encasements, an upper or cervico-cephalic, and a lower or cervico-trunkal segment. The superior one has a clasp under the chin, which can be opened or closed by means of a key, thus permitting of easy removal or reapplication. The inferior one is provided with a hinge posteriorly, and a clasp anteriorly. The surfaces pressed upon by these two enveloping segments serve as points for counter-pressure. Elastic linear extension of the cervical spine is effected by means of two strong spiral springs playing upon upright steel rods, which are placed on either side of the neck. The degree of elastic traction force which is exerted can be regulated by the thumb-screws, which support the spiral springs on the steel rods. The upright rods are provided with a ball-and-socket joint at their lower end, thus permitting of all the normal movements of the head to be made, while at the same time elastic extension is enforced.

FIG. 4195.—Roberts' Jury-Mast



"This appliance leaves all the healthy vertebræ, as well as the muscles of the trunk, unrestricted. Muscular debility and retardation of growth of healthy vertebræ are thus avoided."—M. Josiah Roberts, M. D., in *Medical News*, October 14, 1882.

"This is an instrument which, while not extending over the head, will exert continuous elastic traction upon the diseased vertebræ, and permit of voluntary articular motion. It permits of all the normal movements of the head being made at the pleasure of the patient, or controlled and directed by the surgeon.

"The lower part of the instrument, like that of the jury-mast, is held between the layers of the gypsum bandage, the shafts being curved forward under the arms, so as to bring its base beneath the part supported."—M. Josiah Roberts, M. D., in *The New York Medical Journal and Obstetrical Review*, October, 1882.

Accidents to the Vertebral Column.

"Accidents to the vertebral column derive their chief importance from the resulting injury to the spinal cord; certain portions are more frequently the seat of injury than others, namely, the dorsi-lumbar, the cervico-dorsal, and the atlanto-axial."—A. SHAW.

"Concussion of the spine often develops symptoms of the most serious, progressive and persistent character, not only after apparently slight injuries, but frequently where there is no sign whatever of external injuries (J. E. ERICHSEN). It occurs usually as the result of a fall on the nates or back; the shock is generally not severe, even when the paraplegic condition is well marked; the effects may be immediate, or may not supervene for some time (F. LE G. CLARK). In direct severe injury the primary symptoms vary with the place of injury, the force, and the amount of organic lesion of the cord produced; a blow on the upper cervical region may cause instant death, and on the dorsal region complete paraplegia; or there may be paralysis of motion, less of power over the sphincters, alkaline urine, lowering of temperature of paralyzed parts. The secondary symptoms are usually those of development of inflammation in the meninges; namely, pain in some part or parts of the spine, increased by pressure and motion, and extending around the body, or down the limbs (J. E. ERICHSEN). In the severest forms there are lesions which give rise to hæmorrhage within the canal, and consequent paralysis; usually the blood proceeds from lacerations of the venous plexuses, and collects on the outside of the cord and its membranes, and in largest quantities behind and at the sides; in lesion of the cord itself the hæmorrhage is slight, owing to the small size of its vessels.

"The only treatment must be complete and absolute rest on a couch, in a prone position, rather than the supine, to avoid pressure on the back and relieve passive venous congestion, with dry cupping on either side of the vertebral column, and ice-bags, if comfortable; the secondary symptoms must be treated by continued rest and such counter irritants as mustard poultices, stimulating embrocations, and, finally, setons and issues; when subacute meningitis begins, bichloride of mercury, in tincture of cinchona, is most beneficial; at advanced periods the iodide and bromide of potassium, in full doses, are useful; when inflammation has subsided and paralysis remains, strychnine, galvanism and warm salt-water douches are required (J. E. ERICHSEN)."—"Operative Surgery." Stephen Smith.

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PARALYTIC DEFORMITIES.

Diseases of the Spinal Cord.

"*The principal diseases of the spinal cord*, that is, the pathological conditions to which it is subject, are spinal meningitis, myelitis, and spinal apoplexy. These conditions give rise to or aid in developing a variety of symptoms, which in turn are classed as diseases, such as paralysis (including paraplegia and spinal hemiplegia), general spinal paralysis, and locomotor ataxia. The diseases known as progressive muscular atrophy and infantile paralysis, although their causes are not clearly made out, are generally considered to be connected with affections of the spinal cord. Moderate exercise and a well-regulated nutritious diet, to promote, as much as possible, the healthy assimilation of tissue, should be regarded as a main indication. Galvanism promises to be a powerful adjunct, but time is still required to measure its importance."—"American Cyclopædia."

Affections of Nerves and Muscles.

"*Muscle* (Lat. *musculus*), the fibrous contractile tissue forming the flesh of man and animals, by which locomotion and the various functions of life requiring voluntary or involuntary movements are performed. Whether elongated or enclosing a cavity, this tissue is arranged in the form of fibres, usually in bundles connected by areolar tissue, surrounded by a vascular network, and supplied with nervous filaments. Muscles are so arranged as to produce great velocity, extent of motion, and strength, without injuring the beauty of proportions by the obliquity of their fibres to the tendons and of the last to the bones on which they act, and by the proximity of their points of insertion to the axis of motion of the joints. Muscles are attached to bone by means of tendons, rounded or flattened fibrous cords, white and shining, inelastic and very resisting; aponeurosis or fasciæ are firm, shining fibrous membranes, enveloping the muscles, giving attachment to their fibres, and often fixed to bones like the tendons. Muscles occupy the whole distance between the skin and the bones, and take an elongated, broad or thin form, according to the necessities of the several parts of the body; their strength is in proportion to their length and thickness, and may be rapidly exhausted by continuous exertion. Muscles are called voluntary or involuntary, according as they are or are not under the control of the will; the division is not strictly accurate, as all of the former at times contract independently of the will, and some of the latter are to a certain extent under the influence of volition. The former are generally solid, as in the muscles of the trunk and limbs; and the latter hollow, as in the heart or the muscular layers surrounding cavities and canals. The voluntary and involuntary muscles are also distinguished by their structure; the former consisting of striped, the latter of unstriped fibres. The fibres of voluntary muscles are generally cylindrical, though more or less prismatic or many-sided, being somewhat flattened against each other. They vary in length in different muscles, and in the human subject average $\frac{1}{10}$ of an inch in diameter. Their color in man and the higher animals is ruddy, and they are elegantly marked by transverse or circular striations, giving them a very characteristic appearance, which has led to their being distinguished by the name of striped fibres. They consist of a cylindrical or prismatic mass of contractile substance, marked with the above-mentioned striations throughout its entire thickness, and containing also minute elongated or oval bodies, termed nuclei. Each fibre is invested by a delicate, transparent, structureless and colorless membrane, the sarcolemma, which supports the contractile material and limits its lateral expansion. The fibres are arranged side by side, parallel with each other, and united in small groups or bundles of one hundred to two hundred each. The bundles are again united into larger secondary bundles, connected with each other by areolar tissue, and so on; the entire muscle being invested with an external fibrous expansion of condensed areolar tissue, and abundantly supplied with bloodvessels and nerves. The unstriped or involuntary muscular fibres are soft, pale, flattened bands, apparently homogenous or finely granular, about $\frac{1}{100}$ inch in diameter, with an elongated nucleus in the central part of each one.

"The *contractility* of muscle depends on an inherent property, independent of, though capable of modification by, nervous influence. The stimuli which induce contraction are volition, emotion, impressions conveyed to the nervous centres and involuntarily reflected thence and various physical and chemical agents applied to any portion of the course of a motor nerve or to the muscular fibres. A muscle in action becomes shorter and thicker, changing its relative proportions without any actual change in bulk. After death muscles become fixed and rigid, a condition constituting the *rigor mortis*. In the active contractions which characterize muscles on the application of stimulus, force is exerted against some opposing power; this is attended with exhaustion or fatigue, and requires intervals of rest. Sustained contraction consists of an infinite number of partial momentary contractions acting in succession. Matteucci and Du Bois-Reymond have investigated the electric currents for muscles. The combination of the muscular movement is in most cases so far independent of the will, that we are apt to lose sight of their perfection; but let paralysis affect one side of the body, or contraction draw up a muscle, and the fact becomes at once evident, as may be seen every day in palsy of one side of the face, or strabismus with the turning in or out of the eye. The simple process of walking, performed it may be unconsciously, with its nice adjustments executed by the automatic guidance of the senses rather than by any act of the will, is what the most ingenious mechanician can never effect in an automaton, from the impossibility of harmonizing the many acts which constitute walking. . .

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PARALYTIC DEFORMITIES.

Affections of the Nerves and Muscles.

"Muscle may be hypertrophied from excess of nutrition arising from abundance of formative material, from increased supply of blood, but principally from preternatural formative capacity; the opposite conditions lead to atrophy of muscle.

"Muscles which move a limb in opposite directions are called antagonist muscles. The flexor muscles of the arm, for instance, bend the limb at the elbow-joint, and the extensor muscles draw it back, or extend the arm in a direct line; thus these muscles antagonize each other. There is a sort of passive action in the different muscles of the body, constituting what is termed the natural tone of the system, and when this is lost or partially enfeebled in one set of muscles, their natural antagonists have an undue action on the parts, and cause disfigurement by destruction of the natural balance. The form and position of the face, for instance, keep up a balance of feature in the natural expression of immobility or stillness; those of one side antagonize those of the other. In paralysis of one side of the face, the muscles of that side are deprived of their natural tone and power of action, while those of the other side retain their tone and power as before; the consequence of which is that the latter draw the mouth to their side of the face, while the others are unable to counterbalance this action from want of power to act in the opposite direction. Certain muscles are antagonized by the natural elasticity of the parts to which they are attached; the elasticity of the ribs and that of elastic ligaments of the spinal column may be considered as antagonistic to the natural tone and power of the muscles attached to them, or acting in a contrary direction."—"American Cyclopædia."

Progressive Locomotor Ataxia.

"(Gr. *ἀταξία*, want of order.) This name has been given to a form of paralysis characterized by disorderly muscular movements in consequence of loss of coördinating power, which has been recognized only within the present century. Duchenne described it in 1858-59 more fully than any previous author, and gave it its name. Its pathology and location has been pointed out by Dr. Todd, but its causes were more fully investigated by Duchenne. Romberg called the disease *tabes dorsalis*, and it has also been called *myelo-phthisis*. There is not much loss of muscular power, except as general debility advances, but the diminution of sensation is more marked. The patient has a peculiar gait in walking, throwing the legs out in a jerking and uncertain manner, and, when the disease is pretty well advanced, throws his arms out like a man balancing on a tight rope. He seems to be somewhat in the condition of one who is walking in the dark over uneven ground. That which has been termed the 'muscular sense' is impaired. The harmony of the reflex impressions by which muscular contractions are regulated and the limbs moved and adjusted is so far disordered that either too much or too little contraction is produced at each step. The foot will be thrown out and not properly brought to the ground, and, as if to relieve this deficiency, the patient by an effort of will brings the foot down at the next step with too much force. A chief characteristic is the inability to walk or stand with the eyes closed. It needs the assistance of sight to keep the body erect; the walk is uncertain and reeling even with the eyes open, but, if the patient shut them, he will fall. As the disease progresses, the upper extremities become affected, and it is difficult for the patient to tie his cravat or button his coat, or perform any motions requiring coördination of muscular movements. There are certain premonitory symptoms which have been relied upon, such as fugitive shooting pains in different parts of the body, of a neuralgic character; but they are often found unconnected with the disease, and often absent when the disease is present. One of the early symptoms is incontinence of urine consequent upon relaxation of the sphincter muscle, and an irritable state of the mucous membrane of the bladder; and there is often increased sexual activity, which, however, declines in the progress of the complaint, and at last ends in impotence. A characteristic feature of the disease is transient localized paralysis, such as that of the sixth pair of cranial nerves, which supply the external straight muscle of the eyeball, or the third pair, which supply the elevators of the eyelid, and the constrictor of the iris, so that there is dropping of the lid and dilatation of the pupil, one eye being usually affected more than the other, and vision is sometimes impaired or lost. In some cases these paralytic affections are permanent. When the paralysis of the limbs begins on one side, which it frequently does, it is much oftener upon the left than the right side. Before the disease is much advanced, although the gait is irregular and jerking, the patient retains the power to walk considerable distances.

"After a time the power of locomotion is lost, the patient is confined to his bed, he becomes unable to feed himself, and speech is difficult, sometimes impossible. The disease is distinguished from ordinary paraplegia, or anterior spinal paralysis, by the careful and circumspect gait of the latter; although it has some symptoms in common with general paralysis of the insane, the totality of them will enable a diagnosis to be made. The prognosis is extremely unfavorable; very few cases ever cease progressing, and fewer still recover. The most that can be hoped for is that the disease will remain stationary or progress slowly. Sometimes it develops rapidly, but generally years elapse before the fatal termination, and in most cases death is produced by some intercurrent affection. * * *

"Males are more often affected than females. It is especially a disease of middle life, between the ages of thirty and fifty, although it sometimes occurs before thirty, and Trousseau reports a case in a patient eighty years old. The

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Progressive Locomotor Ataxia.

disease is sometimes associated with general paralysis of the insane, sometimes one and sometimes the other disease appearing first.

"There is no particular plan of treatment established. In Europe and in this country success has seemed to attend the employment of the interrupted galvanic current (farradization), and cases are reported as having been benefited by the continuous current of a strong battery. Long-continued and well-regulated gymnastic exercises were successfully employed by Eisenmann in two out of six cases. The iodide and bromide of potassium are beneficial. Counter-irritation with blisters, issues and cautery has been found of no avail. Moderate exercise and a well-regulated nutritious diet, to promote as much as possible the healthy assimilation of tissue, should be regarded as a main indication. Galvanism promises to be a powerful adjunct, but time is still required to measure its importance."—"American Cyclopædia."

PARALYTIC AND SPASTIC DEFORMITIES.

Paralysis, Palsy, Hemiplegia, Paraplegia.

"*Paralysis*.—Abolition or great diminution of voluntary motions, *myoparalysis*, and sometimes of sensation in one or more parts of the body.

"*Palsy* is said to be local when it affects only a few muscles. When it extends to half the body, vertically or horizontally, it is called *hemiplegia* or *paraplegia*. It is commonly symptomatic of disease of the brain or of the nerves themselves, and is a frequent accompaniment, precursor, or successor of apoplexy—*phrenoparalysis*. The immediate cause is generally pressure, either by blood effused or by serum, or by vascular turgescence. At its onset, therefore, bloodletting may be advisable, but afterwards the disease becomes one of nervous debility, and requires stimulants to the paralyzed parts, or to the mucous membranes—frictions, sinapisms, blisters, the moxa, baths, electricity, galvanism, purgatives and the nux vomica, which last has the property of exciting movements where the will has no longer power."—DUNGLISON.

"*Spasm, spasmus, spasma, spasis, sparagmus, synolcé, spado, spadon* (F. *spasme*), *σπασμος*, from *σπᾶω* ("I draw").—The Greeks gave this name to all kinds of convulsions. It is now usually applied to involuntary muscular contractions, and these again have been divided into *tonic* spasm, *paratonia*, which consists in permanent rigidity and immobility of the muscles that are the seat of it (*tetanus*); and *clonic* spasm, which consists in alternate contractions and relaxations (convulsions)."—DUNGLISON.

"*Paralysis* gives rise to deformities in the following manner: The joints lose their support and bend outward or inward, according to the inclination of the joint surfaces in cases of general paralysis of the muscles, or bend toward the contracting muscles in cases of partial paralysis. When paralysis of motion and sensation is complete, or very extensively developed, it greatly interferes with the nutrition of the part."—LEWIS A. SAYRE, M. D.

General Treatment.

"Much benefit may be derived from the use of *dry heat*. It is especially adapted to the treatment of paralytic deformities, and is beneficial from the fact that it solicits more blood to the part to which it is applied. Clay tubes of proper shape and size may be heated to any degree bearable, and then the limb may be placed within them."—LEWIS A. SAYRE, M. D.

"The *bath* is another item of general treatment, the value of which can hardly be over estimated. The temperature is to be varied according to the constitution of the patient and the character of the deformity. In the treatment of paralytic deformities the bath is one of the most useful adjuvants to other treatment that can be employed. In such affections it should always be warm and should be continued for a long time. Instead of being applied to the whole body, it should be applied to the part affected. In such cases the object of the bath is to increase the circulation of blood through the paralyzed parts for the purpose of increasing their nutrition."—LEWIS A. SAYRE, M. D.

"*Inunction*.—Oil—particularly petroleum—may be of benefit; as a general rule, however, all greasy substances are of very little value in this connection. The laity all have great faith in ointments, liniments and various kinds of oil, for the cure of paralyzed limbs, contracted tendons, &c. My belief is that the chief—and I may say the sole—benefit arising from their employment is due to the friction and manipulation which necessarily accompany their use, and not to any virtue possessed by the grease employed, unless it be that the small quantity of phosphorus sometimes found in the combination may be a source of benefit.

"*Strychnia* is a remedy so constantly employed in the treatment of paralyzed muscles that a brief reference should here be made to its use. It should be administered in doses sufficient only to produce slight twitchings of the muscle. The administration of one-fiftieth grain doses three times a day, and the subcutaneous injection of one-sixtieth of a

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General Treatment.

grain into the muscle, once in eight or ten days, will ordinarily be sufficient to produce the desired results, and will also, as a rule, be of much service. Over-fatigue of muscles can be brought about by exciting undue contractions with this remedy, as well as by application of electricity, or by excessive manipulation. Such fatigue is to be carefully avoided.

"*Electricity*.—Its apparent value as a means for restoring vitality to paralyzed muscles is indisputable. There are a few rules which should regulate its application.

"1. When applying electricity for the restoration of paralyzed muscles, do not apply it *too long*. Three or five minutes every day, or every other day, is sufficient in a majority of cases.

"2. Do not apply it *too strong*. A strong current is very likely to give rise to over-fatigue of the muscles, which will be as positively injurious as that induced by any other means, and over-exertion must, therefore, be carefully avoided.

"3. Always restore the muscle as nearly as possible to its normal position, by means of some artificial support, and retain it there, approximating its origin and insertion before the battery is applied. * * * Muscles that have entirely lost their excitability upon application of the electric current, are incapable of contraction. The production of even a few contractions will indicate that treatment persistently applied will finally greatly increase the power of the muscles. But if the contractions are forced, as is exceedingly apt to be the case unless great care is exercised, it will be found that, perhaps, the next day no contractions can be obtained. The slight power of contraction which some muscles may have is, doubtless, many times entirely destroyed by the excessive use of the electric current, the muscles being over-fatigued by the stimulus the same as they would be by over-work.

"For the purpose of determining whether a muscle has undergone fatty degeneration, it is only necessary to remove a small portion by instruments especially devised for that purpose (see page 12), and then submit it to microscopical examination. One precaution, however, is to be taken, namely, to examine the muscle suspected at different points from one end to the other. When this has been done, the prognosis can be established relative to the restoration of lost muscular power by means of the electric current."—(See page 24), "Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M. D.

Apparatus for Paralysis, Palsy, Hemiplegia, Paraplegia.

"The various forms of paralysis affecting the extremities may be relieved by apparatus."—STEPHEN SMITH.

The apparatus represented by Fig. 4196 is for hemiplegia, affecting the limb to the hip joint. We have often had occasion to make it, and found it to answer a good purpose, both as a support and in aiding the restoration of the mobility of the muscles. It answers to the same description as Fig. 4198, but is carried up to the pelvis. On to a broad steel pelvic band we fasten the artificial muscles for flexion or extension, as the case may require.

FIG. 4196.—Apparatus for Hemiplegia.



MEASUREMENTS REQUIRED.

1. Patient's name and description of the case.
2. Patient's age.
3. Right or left leg.
4. Length from sole of foot to ankle joint, Inches.
5. Length from sole of foot to knee joint, "
6. Length from sole of foot to trochanter major, "
7. Length from sole of foot to crest of ilium, "
8. Circumference of calf, "
9. Circumference of knee, "
10. Circumference above knee, "
11. Circumference of thigh, "
12. Circumference of pelvis one inch below iliac crests, "

Patients will furnish their own laced shoes or send the following additional measurements if they wish us to send them :

- a. Length of sole of foot, Inches.
- b. Circumference of ball of foot, "
- c. Circumference of instep, "
- d. Circumference above ankle, "

ORTHOPÆDIC.

PARALYTIC AND SPASTIC.

Apparatus for Paralysis, Palsy, Hemiplegia, Paraplegia.

"The thigh may suffer from paralysis of various muscles, but the most important is the quadriceps femoris—inability to extend the leg upon the thigh results from its paralysis or rupture, and the patient is no longer able to walk. The condition may be relieved by apparatus having strong elastics attached, working upon eccentric leverages, leaving the knee entirely free from all pressure, and, after the leg is bent by the flexors, extension of the leg upon the thigh promptly occurs."—STEPHEN SMITH.

FIG. 4197.
Apparatus for Paraplegia.

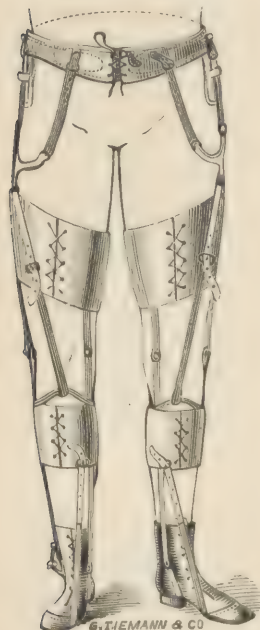


FIG. 4198.
Apparatus for
Partial Paralysis
of Leg or Thigh.



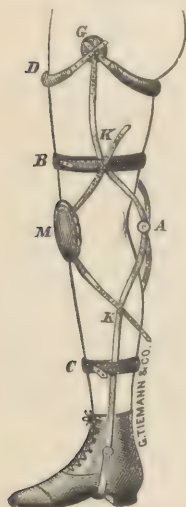
The apparatus for paraplegia answers to the same description as the one for hemiplegia, except that it is double. It is used when both the lower extremities are affected. A general description of the case is necessary to guide us in placing the artificial muscles in the right spot. The directions for measurements are the same as for the apparatus for hemiplegia, Fig. 4196.

In cases of wasting palsy, or when certain groups of muscles become atrophied, losing the power to perform their functions, an apparatus as shown (Fig. 4198), suited to the case, should be worn. The muscles are excited into action, and aided by artificial substitutes made of elastic rubber or steel, placed on the instrument so as to gently exercise the affected parts. This will often recall them to a sense of their duty.

DIRECTIONS FOR MEASUREMENT.

1. Patient's name.
2. Patient's age.
3. Right or left leg.
4. Length from sole of foot to ankle joint, . . . Inches.
5. Length from sole of foot to knee joint, . . . "
6. Length from sole of foot to upper third of thigh, "
7. Circumference of calf, "
8. Circumference of knee, "
9. Circumference above knee, "
10. Circumference of thigh, "

FIG. 4199.
Stephen Smith's
Paralysis Apparatus.



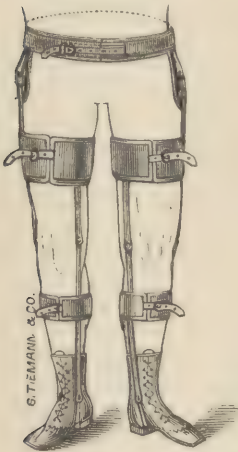
"In cases of infantile paralysis, with atrophy and shortening of the limb, it is very difficult to supplement the loss by any ordinary means. The limb not only has to be strengthened, but also to be lengthened, in order to restore its function. This may be effected by the following apparatus, namely, two upright steel bars, *K*, attached to the shoe, pass up either side of the leg nearly to the knee; they are then curved backward to the middle of the popliteal space, where they unite into a stop joint, *A*, which allows partial bending of the knee; from this point two lateral steel bars, *K*, diverge and pass up on either side of the thigh, the external as high as the trochanter major, *G*, and the internal nearly to the groin; to the upper ends of these bars two bands are attached, the posterior being thickly padded and resting under the tuber ischii, and the anterior, *D*, of lighter material; a knee-cap, *M*, maintains the leg in position by means of lateral straps; two light bands pass around the leg, *C*, and the thigh, *B*; the shoe has an inside elevated sole to which the foot is attached, and which permits support on the foot in the act of walking. The effect of the apparatus is to render the defective limb of the same length as the well limb: the spine being thereby straightened and the steps made equal; the body is carried on the posterior band. This apparatus is adapted to cases of hip-joint disease in the stage of recovery, for slight traction may constantly be made."—"Operative Surgery." Stephen Smith, M. D.

ORTHOPÆDIC.

PARALYTIC AND SPASTIC DEFORMITIES.

Apparatus for Paralysis, Palsy, Hemiplegia, Paraplegia.

FIG. 4200.
Apparatus for the Support of Weak Legs.



This apparatus is for the support of weak legs when, by reason of relaxed joints, softening of the osseous structure or partial paralysis, they cannot quite bear the weight of the body, but where the muscles still retain some power to perform their respective functions. Very light steel springs are secured to shoes, and carried up the sides of the legs and to the pelvis. They are provided with joints corresponding to the natural ones, and secured to calf, thigh and pelvis by well-padded bands and buckles.

MEASUREMENTS REQUIRED.

1. Patient's name.
2. Patient's age.
3. Length from sole of foot to ankle joint, Inches.
4. Length from sole of foot to knee joint, "
5. Length from sole of foot to hip joint, "
6. Length from sole of foot to iliac crests, "
7. Circumference of pelvis one inch below iliac crests, "
8. Circumference of thigh, "
9. Circumference of calf, "

Valgus Ankle.

"This condition, known popularly as *weak ankles*, is not alluded to in surgical works, and consists in a laxity of the internal lateral ligament and consequent bulging of the internal malleolus, with a tendency to the formation of valgus. It may exist quite independently of the latter, and is not uncommon in infantile paralysis of the lower limbs, and in cases where the arch of the foot is increased and the plantar fascia tense. In some cases the internal malleolus is overgrown laterally, and a condition somewhat similar to the projection of the inner condyle in atonic genu valgum results. I have seen small bony spicules in the neighborhood of the inner ankle, reminding me of those met with in the tibia, and occasionally on the internal tuberosity of the femur. If unchecked, some of these cases may pass, mechanically, into valgus.

"*Symptoms.*—The deformity is obvious, and occurs usually in quickly growing children or adolescents with lax fibre. The ankles knock together in walking, and this, with the wearing away of the boots where the ankles rub each other in walking, are noticed and complained of. The patient is very apt to tread or slip over to the inner side of the foot, and sometimes this gives rise to severe sprains and, in two or three cases I know of, a Pott's fracture was thus produced.

"*Treatment.*—This consists in giving firm support to the joint by good elastic anklets, and by the wearing of a boot and support with a properly adjusted T-strap (see Fig. 4202). All prolonged efforts of standing and walking must be avoided, and the joint strengthened by massage, frictions, &c."—"Practical Orthopædics." Reeves.

Fig. 4201.
Detmold's Ankle Spring.



This brace is for weak ankle and after-treatment of club-foot. It consists of a well-tempered steel spring, forged at one end into a wide flange, by which it is rivetted to the sole of the shoe. By a well-padded band, secured to its top, it is fastened with a strap and buckle to the leg below the knee. It has no joint at the ankle. The tendency of the spring being forward and outward, it will, when brought to the leg by securing its padded band at the garter, lift the toes and evert the foot so as to bring the sole of the latter flat to the floor.

The lace shoe, an ordinary one as usually found, freely made, is narrowed across the instep by the removal of a wedge-shaped piece from its upper; the eyelets being replaced, this enables the tighter lacing of the shoe at the instep, firmly securing the heel of the foot to its place in the shoe.

MEASUREMENTS REQUIRED.

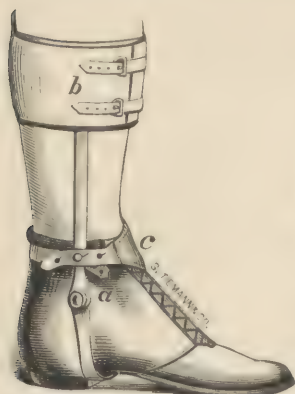
1. Send well fitting shoe or shoes to lace and of a size larger than usually worn, so as to admit of a steel insole that we secure into the same.
2. Length from sole to garter (below the knee), Inches.
3. Circumference at garter, "

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Apparatus for Weak Ankle and Short Leg.

FIG. 4202.
Weak Ankle Brace.



The ankle is often weak from paralysis of the muscles attached to the bones of the foot. The joint is easily strengthened by apparatus with lateral steel braces fastened to the shoe, and a T-strap.

FIG. 4203.—Patten,
to Elevate a Short Leg.

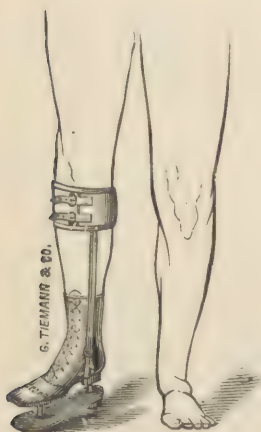


For a short leg, the result of infantile paralysis, when the bones have not kept pace in growth with those of the corresponding extremity, we make an extension to correct the patient's limp and to guard against the danger of spinal curvature. The apparatus consists of a steel frame of proper height, securely fastened under a plain shoe. The steel base has a leather sole attached, to avoid noise when walking on pavements, stone or wooden floors, and to prevent falling on slippery ground. These extensions are light and comfortable.

DIRECTIONS FOR MEASUREMENT.

1. Have the patient (both feet bare) stand up; place books or blocks of wood under the short foot until the shoulders and pelvis are in a horizontal plane, then measure these books or blocks, which will be the height required for extension.
2. Send us a well-fitting shoe.
3. Right or left leg?

FIG. 4204.—Extension for
Short Leg and Brace for
Weak Ankle, combined.



If shortness of a leg is accompanied with weak ankle and consequent inability to bear the weight of the body, the muscles being too weak to keep the ankles straight, the simple contrivance described (Fig. 4203) is not sufficient, and the apparatus, as shown by Fig. 4204, will be required to support the joint. This is in reality the apparatus Figs. 4203 and 4204 combined.

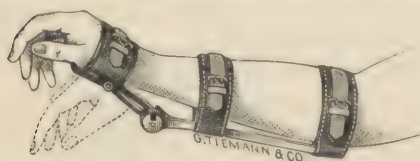
DIRECTIONS FOR MEASUREMENT.

1. Height of the extension as directed for Fig. 4203.
2. Right or left leg?
3. Distance from sole to ankle joint, Inches.
4. Distance from sole to calf, "
5. Circumference of calf, "
6. Send us a well-fitting laced shoe.

If we are to furnish shoes, send the following measurements:

- a. Length of sole of foot, Inches.
- b. Circumference of instep, "
- c. Circumference of ball of foot, "
- d. Circumference above the ankle, "

FIG. 4205.—Apparatus for Contracted Wrist.



Apparatus for the Arm, Forearm and Wrist.

"The forearm and arm affected by paralysis require the appliances recommended for un-united fracture. The wrist may fall into the position of flexion, wrist-drop, from paralysis of the extensors of the carpus. This malposition is readily rectified by a simple instrument, which makes elastic pressure on the thenar and hypothenar eminences."—STEPHEN SMITH.

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PARALYTIC AND SPASTIC DEFORMITIES.

Wrist Drop. Apparatus.

"Wrist Drop."—This deformity consists, as its name implies, in a dropping of the hand, which is an undue flexion consequent upon paralysis of the extensor muscles of the forearm. The most common cause is lead poisoning. When the lead palsy, as it is sometimes called, has continued for some time, atrophy of the muscles is a common result, and in many cases it is very marked.

"The opinion is quite common that the lead manifests its poisonous effects alone upon these extensor muscles, but that is not true. The lead affects the entire system, and the patient has not only wrist-drop, but he has diminished muscular power in all the muscles of the body. The more common manifestations, however, of lead poisoning is paralysis of the extensor muscles of the hand and fingers, and the patient is unable to extend the hand and fingers. The use of cosmetics is a very fruitful source of lead poisoning among women.

"The indications in the treatment are to eliminate the poison from the system, to restore lost or impaired muscular power, and to assist the muscles in the performance of their functions. The means to be used for restoring lost or impaired muscular power (in addition to internal treatment) are galvanism, hypodermic injections of strychnine, friction, &c. These measures must not be employed, however, in such a manner as to produce over-fatigue of the muscles. Galvanism should be used only when the muscles are properly supported, so that they will not be obliged to lift any weight when stimulated to contract.

"Of the value of Hudson's apparatus in cases of this kind, I cannot speak in too high terms. It is very light and beautiful, is worn without inconvenience, enables the patient to exercise the muscles of the hands and fingers constantly, and thus materially facilitates nutrition and development."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre.

FIG. 4206.—Hudson's Wrist Drop Apparatus.

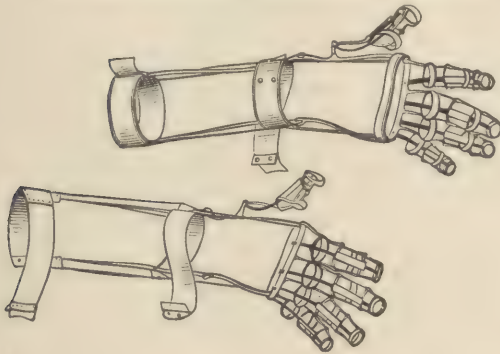
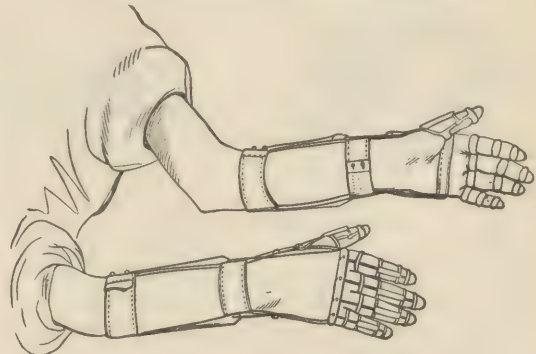


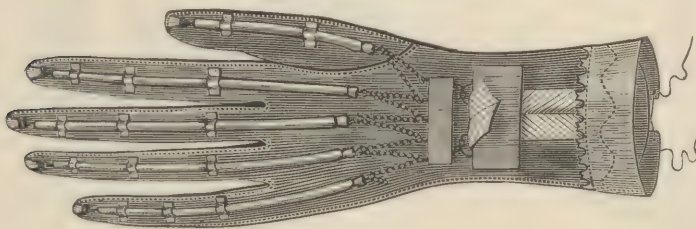
FIG. 4207.—Hudson's Apparatus, applied.



Fingers.

"The fingers occasionally suffer paralysis of the extensor muscles, giving only flexion of the fingers. This condition may be greatly relieved by a light apparatus which constantly extends the fingers and wrist (see Fig. 4208)." —STEPHEN SMITH.

FIG. 4208.—Glove for Paralysis.



This apparatus, made of strong yet pliable material, reaches about two inches above the wrist, and is arranged to lace snugly, to prevent displacement.

Five india-rubber cords, acting as artificial extensors, are distributed along the back of the fingers and thumb. The ends of these cords are provided with hooks which take hold of loops at the extremities of the fingers and thumb, and of chains connected to straps at the wrist. These artificial muscles act in-

dependently one of the other, and their strength can be regulated by hooking them to the chains so as to make them more or less tense. They are passed through loops to prevent their slipping out of place.

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PARALYTIC AND SPASTIC DEFORMITIES.

Writer's Cramp Apparatus.

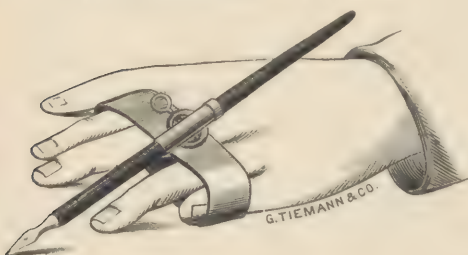
"*Writer's cramp, graphospasmus, mogigraphia, chorea scriptorum, paral'ysis, notario'rum, scrivener's cramp or paral'ysis, scribe pal'sy, pen pal'sy, functional spasm, stammering of the fingers, (F.) crampe des ecrivains.*—A condition of the fingers in which they are unable to hold a pen, or in which one or more of the muscles of the fingers are irregularly and irresistibly contracted. A similar condition of the nerves and muscles concerned is seen in the *shoemaker's cramp, milking cramp, musician's cramp, composers' and seamstresses' cramp.*"—DUNGLISON.

FIG. 4209.—Velpeau's Writer's Cramp Apparatus.



There are many devices for the relief of this malady, the above is one of the simplest and most effective. It consists of an oblong ball, made of wood or hard rubber, to be grasped by the hand, keeping it in a proper position. To this are attached a couple of half-rings, serving as rests for the index and middle fingers. A penholder passes through the neck of the ball at a convenient place near the extremity, which can be adjusted and made firm by a thumb-screw. Thus a person affected with writers' cramp may be effectually treated without being necessitated to leave off writing.

FIG. 4210.—Nussbaum's Bracelet.



Prof. v. Nussbaum, of Munich, deems *writer's cramp* to be caused by the pathologically changed antagonism of the muscles in which there is always present spastic contraction of the flexors and adductors along with debility of the extensors and abductors. He constructed a penholder which is to be conducted by means of the extensors and abductors, instead of the flexors and adductors. In this manner cramp is not only avoided, but the very act of writing becomes the remedy for the removal of the evil. The bracelet consists of an obliquely oval ring, to which a penholder is fastened in such a position that the pen will easily touch the writing paper when the hand is rested upon the desk. The thumb and first three fingers are put into

the ring, the thumb but little, the third finger to near the metacarpal bone—the fourth finger is left out. By extending and spreading the fingers inside of the ring it is held fast, but drops off as soon as the fingers are flexed. By means of these bracelets the proper gymnastic exercises are performed to overcome the debility and to restore the antagonism of the muscles. The apparatus not only enables the patient to do his usual writing, but, according to v. Nussbaum, the more he writes the sooner will a cure of his case be brought about. The rings are made of hard rubber and are of four different sizes.

FIG. 4211.—Charcot and Cazenave's Apparatus for Writer's Cramp.

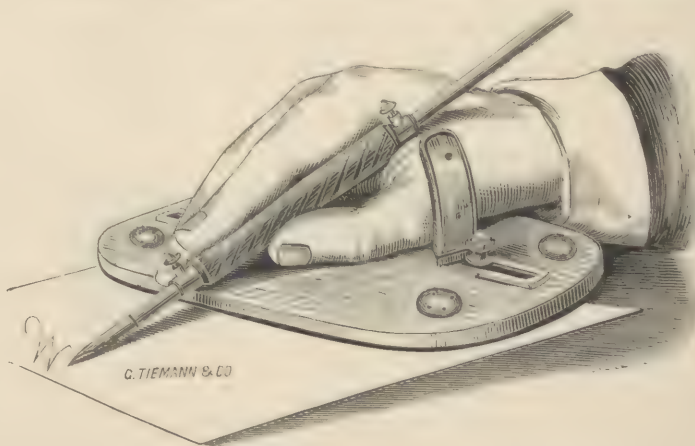
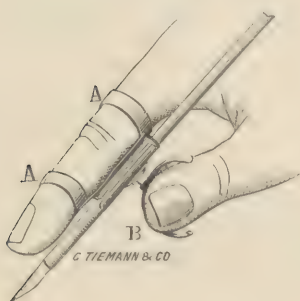


FIG. 4212.—Mathieu's Writer's Cramp Apparatus, for Thumb and Index Finger.



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PARALYTIC AND SPASTIC DEFORMITIES.

Writer's Cramp Apparatus.

FIG. 4213.—Charrière's Writer's Cramp Apparatus.

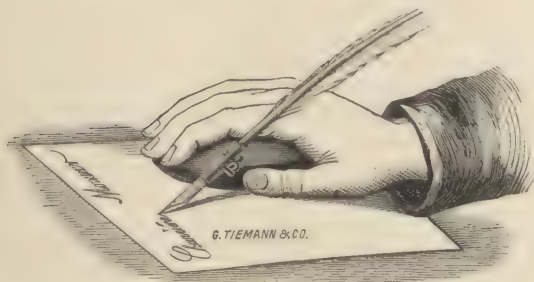


FIG. 4214.—Writer's Cramp Apparatus, Pince Porte-plume.

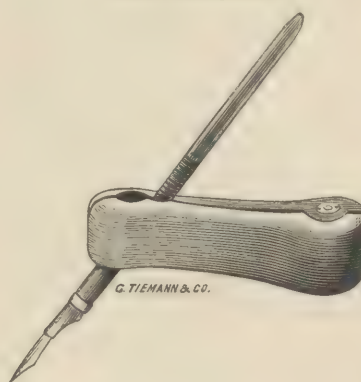


FIG. 4215.—Mathieu's Writer's Cramp Apparatus, for Three Fingers.



FIG. 4216. Writer's Cramp Apparatus.

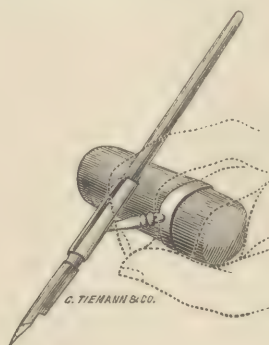
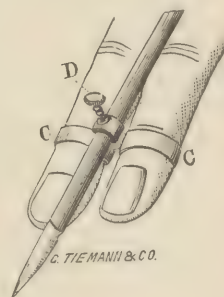


FIG. 4217.—Writer's Cramp Apparatus, for Index and Middle Finger.



PARALYTIC, SPASTIC AND RACHITIC DEFORMITIES.

Genu Valgum.

"*Genu valgum* is a deformity in which, on standing with the knees extended and touching, one or both knees are directed inwards and the malleoli separated. *Genu varum* is the opposite deformity, *i. e.*, when standing with the malleoli touching, the knees are more or less separated.

"*Varieties*.—It may be *single* or *double*, whatever its cause, the double forms being commonest, but the traumatic forms are usually unilateral. It may be *congenital* or *acquired*, and there may be valgum of one side and consecutive accommodative varum of the other, or *vice versa*.

"*Causes*.—Any of these deformities may be either *congenital*, *rachitic*, *atonic*, *statical*, *spastic*, *paralytic*, *traumatic*, *arthritic*, *senile*, or *inherited*; and their nomenclature and classification may be arranged according to their ætiology. Another ætiological classification is into *pathological* and *traumatic*; the former includes all those above given, with the exception of the traumatic cases. *Predisposing causes* are to be found in bad hygienic surroundings, insufficient food as regards quantity and quality, rickets, muscular and ligamentous debility, &c. *Exciting causes* are to be sought in errors in the mode of standing, unequally distributed pressure, the carrying of weights on the head or back, producing flat-foot and secondary genu valgum, or *vice versa*. Miculicz considers the hyper-extension of the legs on the thighs, which occurs in rickety subjects at the end of extension, and permits increased rotation of the tibia outwards, as a pathological result rather than a cause. Young bricklayers, and especially bakers, who carry heavy loads of bread and also work for hours in a warm moist atmosphere, which is relaxing to the tissues, often are affected by it.

"The *atonic cases* are due to muscular and ligamentous debility, and possibly to some nerve debility also, by which the muscles are not kept in a sufficiently tonic condition; the *rachitic* are due to changes chiefly in the direction of

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PARALYTIC, SPASTIC AND RACHITIC DEFORMITIES.

Genu Valgum.

overgrowth in a downward or inward sense, or both, of the internal femoral condyle, with or without curvature of the shaft, and in several cases changes are also found in the head of the tibia. In well marked rachitic cases the joint will frequently be found loose and the tibia rotated on the femur. In other cases there will be an appearance of rotation, on account of the tibial diaphysis being united to its upper extremity at an angle which is open externally, and also because the tibial shaft is twisted inwards so that its crest is directed somewhat inwards. A bony spiculum or process is often present at the upper and inner part of the tibia near the insertion of the internal lateral ligament.

"The *pathogenesis* of most of the other forms of genu valgum and varum, as well as those just given, has been the cause of considerable difference of opinion among surgeons of late years. These various views may be arranged under three heads, viz.: 1. The ligamentous theory; 2. The muscular; 3. The osseous.

"The *ligamentous theory* was supported by Stromeyer, Guérin, Blasius, &c.; but two opposite views were held by its supporters. Some considered that the *internal* lateral ligament was relaxed primarily, so that there was a looseness on the inner side of the joint, allowing the inner condyle to overgrow laterally and also downwards, because of the gap permitted between it and its corresponding tibial surface. Others thought that the *external* lateral ligament was primarily at fault, being shortened, and the pressure thus produced on the outer condyle and corresponding articular surface of the tibia, caused their atrophy, or rather deficiency of normal growth, while the inner portions of the joint had more play to develop. Atrophy of the outer section of the joint is also the result of relaxation of the internal lateral ligament. To the former view it has been objected that the relaxation of the internal lateral ligament is secondary to the changes in the bones; and, to the latter, that the external lateral ligament retracts to accommodate itself to the altered position of the articular surfaces on the outer side of the joint, and, therefore, this shortening is also secondary, and, moreover, that there are cases in which no shortening of the ligament can be made out.

"The *muscular theory* is also divisible into two opposing views. The one attributes genu valgum to *shortening* of the biceps, popliteus and tensor fasciæ latæ; the other considers the deformity to be due to relaxation of these structures. Duchenne, Bonnet, Verneuil, Guérin, Little, Adams, Brodhurst, and others, have supported one or other of these views but not, so far as I am aware, to the exclusion of osseous changes, whether primary or secondary. The supporters of this theory maintain that there is a primary contraction; then a retraction of the muscles on the outer side of the joint, and that the bone changes, if present, are secondary. The objections to this view are that, in many cases, no shortening or tension of the external muscles can be made out, and that in those cases in which it exists it is secondary. Paralytic cases are of course explainable by this theory, *i. e.*, lack of supporting power in the muscles and of tone in the ligaments, and not by the *antagonist* theory. In these cases, and they are common in infantile paralysis, nearly all the muscles are paralyzed, so that there are no active antagonists to produce the distortion. Verneuil admits another set of muscular cases, occurring about the age of puberty until the age of twenty, in which he says that the muscles of the inner side of the thigh are atrophied, while the biceps is contracted.

"The *osseous theory* attributes genu valgum and varum to primary changes in the lower epiphyses of the femur, or to the lower portion of its diaphysis, including in some cases the upper end of the tibia. These bony changes may be due to rickets, whether infantile, adolescentium or senile, or to other local inflammatory or general osseous changes leading to hypertrophy of the inner part of the joint. In these, as in other cases, there may be atrophy of the outer portion of the joint, or this may be normal. Of recent years Annandale, Ogston, Chiene, McEwen, Barwell, and other surgeons, have acted chiefly on the belief that the main change—whether primary or secondary—was in the bones, and mostly at the lower end of the femur.

"I think all will agree that any of the theories mentioned are too exclusive to explain the varying phenomena met with in studying a large number of cases of these deformities. Genu valgum is not, as a rule, the result of but one cause, originating invariably in only one set of structures; but is frequently due to a series of causes, some of which are primary and of more importance than the rest, and of these my experience has taught me that the bony cases are of more frequent occurrence than the atonic, or those due to muscular and ligamentous weakness.

"In *atonic* statical cases (*i. e.*, those caused through long standing, walking and wrongly directed pressure in delicate subjects) there are commonly *three stages* and grades of the deformity. In the *first stage* there is stretching of the internal lateral ligament through the altered direction of the axis of pressure towards the inner side of the joint; and Mickulicz has found this internal ligament tense and hypertrophied, instead of relaxed, and Owen and Linhart have made similar observations. The last named observer found the external lateral ligament lengthened, but this is quite exceptional. Probably the crucial ligaments, especially the posterior portion attached to the internal condyle, is also stretched. Lannelongue has found the posterior crucial rudimentary and anterior absent. If the patient now comes under observation the case would be considered a mild one.

"In the *second stage* the tendon of the biceps, the external lateral ligament and the ilio-tibial band of the fascia lata, all on the outer side of the joint, become contracted, and this serves to increase the deformity.

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Genu Valgum or Knock-Knee. Apparatus.

"In the *third stage* bony changes become more noticeable. The internal condyle becomes enlarged laterally, also elongated and separated from the tibia; and if the ligaments on the inner side be very lax a depression can be distinctly felt between the femur and the tibia; but as a rule the enlargement of the inner condyle fills up the gap that would otherwise exist between the bones, or the internal tibial tuberosity enlarges and fills the gap, but this is exceptional in my experience. The external condyle and outer tuberosity of the tibia, having to bear the body weight, become pressed together and either atrophy or cease to grow, and thus serve to accentuate the deformity.

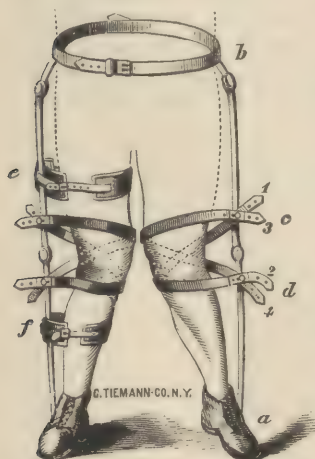
"*Treatment.*—This must vary according to the severity of the case, and, to some extent, according to the cause. The object being to bring the limb into a normal position, the only question is as to the best mode of doing it. Until about the last dozen years, no *rapid* methods were known to or generally adopted by surgeons, and treatment was confined to splinting and tenotomy. Reduction may, now-a-days, be accomplished *gradually* or *at once*; and even in *forcible manual or instrumental straightening*, complete reduction need not be attempted at once, but may be done piecemeal at several sittings. The surgical treatment consists in the use of splints, instruments and in operative procedures. The instruments are divisible into two kinds, according to the nature of the case, *i. e.*, those allowing the patient to walk, and those for use only when the patient is in a recumbent posture. The *operative procedures* may be divided into five, *viz.*: 1. Tenotomy and gradual reduction; 2. Forcible reduction; 3. Osteotomy; 4. Osteoclasy; 5. Epiphysal chondrotomy. There is external wound only in tenotomy, osteotomy and chondrotomy, but the first is subcutaneous and the second practically so.

"In slight cases, relieving the limbs of the body weight, and the application of well-padded splints to the outer or inner side of the limb, will often suffice. Some surgeons prefer to act on the inner side, using the internal condyle as a fulcrum and taking leverage from the malleoli, thus gradually drawing the leg or legs inward. Others prefer applying the splints on the outer side, taking the fixed points at the trochanter and external malleolus and slowly forcing the knee outwards, and yet others apply splints to both sides of the limb."—"Practical Orthopædics." Reeves.

"The deformity consists in a bending of the knee inward. It results from weakening of muscular support, the joint being unable to properly sustain the body, and with this there is stretching of the internal lateral ligament. Sometimes the support is so feeble and the relaxation of these ligaments so great as almost to permit luxation.

"The pain which is sometimes produced by walking, when the patient is fully grown, will excite reflex contractions in certain muscles, and the biceps may become so firmly contracted that it is impossible to bring the limb into its normal position without an operation. If you see these cases before reflex contractions have been excited, the limbs can be easily restored to a straight position, but will as readily return to the abnormal position when the retaining force is removed. When, however, adult life has been reached and *contracture* of the biceps muscle has occurred, it will be necessary to divide it before the deformity can be corrected. It also becomes necessary in some cases to divide the fascia as well as the muscle before proper relief can be obtained. When the necessary sections of contracted tissues have been made, you must make extension from the foot, and at the same time at right angles to the side of the leg at the knee.

FIG. 4218.—Genu Valgum Brace.



"This can be done by placing the patient upon a bed, the foot of which is elevated, and making extension upon each leg from below the knee by the adhesive plaster and weight-pulley, applied in the usual way (page 583).

"An upright is placed on either side of the bed opposite each knee, and a broad band, passed around the inside of the knee, terminates in a cord which runs over pulleys in the upright, and to which is attached a weight which can be increased or diminished according to the patient's comfort. These two constant tractile forces are continued until the wounds made in performing tenotomy have entirely healed, by which time, in many cases, the legs will have become comparatively straight. But, in the majority of instances, the patients will be compelled to wear an artificial support to keep them in this position for many months before perfect restoration will have taken place.

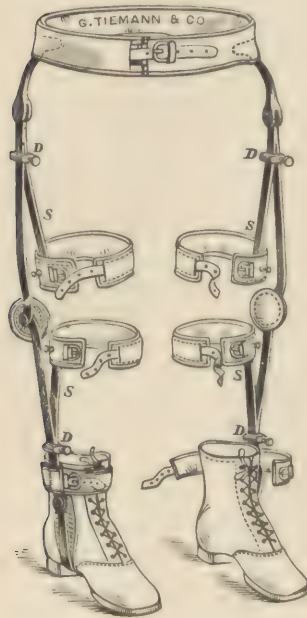
"The instrument for this purpose consists of a circular belt of steel around the pelvis, to either side of which, opposite the femur, a rod passes down, jointed at the hip and also at the knee, terminating in a circular band, which half surrounds the leg just above each ankle, or in the outer side of the shoe at *a*. These two rods are made of spring steel and *bowed outward*. Opposite the knee joint an elastic band passes around the inside of the knee and is secured to these flexible rods above and below the knee. *e* is a circular band around the thigh."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre.

The same measurements are required as for Fig. 4219.

ORTHOPÆDIC.

PARALYTIC, SPASTIC AND RACHITIC DEFORMITIES.

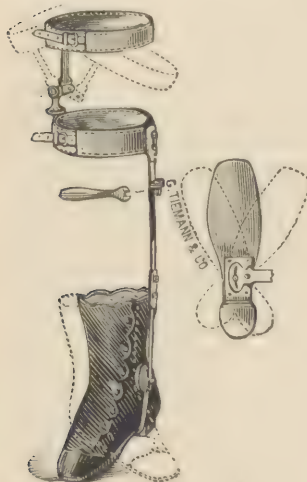
Genu Valgum or Knock-Knee. Apparatus.

FIG. 4219.
Truehart's Genu Valgum Brace.

"The accompanying cut well illustrates a modification of brace for the treatment of knock-knees and similar deformities of the legs, which presents, I think, a new and valuable improvement and possesses decided advantages over the forms of brace now generally in use. The springs, *s, s, s, s*, the bearing of which can be delicately adjusted by shifting the slides, *d, d, d, d*, up or down, are the characteristic feature of this apparatus. The brace being attached at the site of deformity on either side by means of springs, which fit closely and firmly to the limbs, perfect coincidence and harmony of movement between leg and brace is secured, which is sadly wanting where the attachment is effected by means of the long straps of the ordinary brace. The corrective force exerted is continuous, and in all positions the wearer may assume is decided and equable, while, at the same time, the articulations of the limbs have such a normal freedom of excursion, laterally as well as antero-posteriorly, that no disfiguring habit of gait is liable to be contracted by the patient, and there is no tendency to trip or fall; even the child of only a few years can wear the brace with little or no annoyance, and, on first trial, walk or even run with surpassing ease and precision."—*New York Medical Record*, August, 1878.

DIRECTIONS FOR MEASUREMENT.

1. Patient's name and age.
2. Length from sole to ankle joint, Inches.
3. Length from sole to knee joint, "
4. Length from sole to hip joint, "
5. Length from sole to iliac crest, "
6. Circumference of pelvis, "
7. Circumference of thigh at *s*, "
8. Circumference of leg at *s*, "
9. Circumference of ankles at *D*, "

FIG. 4220.—Stillman's
Knock-Knee Apparatus.

"A brace to overcome this deformity should be provided, with facilities for twisting the foot into a normal angle with the leg, and for twisting the leg into better relations with the thigh, at the same time acting laterally at the knee joint to overcome the angular obliquity which constitutes the most prominent feature of the deformity. The brace (shown in Fig. 4220) possesses these advantages and also permits the normal degree of motion in the knee and ankle joints during treatment. It can be worn under the clothing with very little discomfort and is not especially noticeable. The figure explains its action, but should show another girth just above the ankle, and also another on the thigh, since it is necessary to have firm fixation on the leg and thigh, if one is to be rotated upon the other.

"In severe cases this fixation may be assisted by nooses of strong moleskin plaster, encircling the limb opposite the girths, and fastened to the girths by tongues, which protrude through slits in the stockings."—C. F. STILLMAN, M. D.

DIRECTIONS FOR MEASUREMENT.

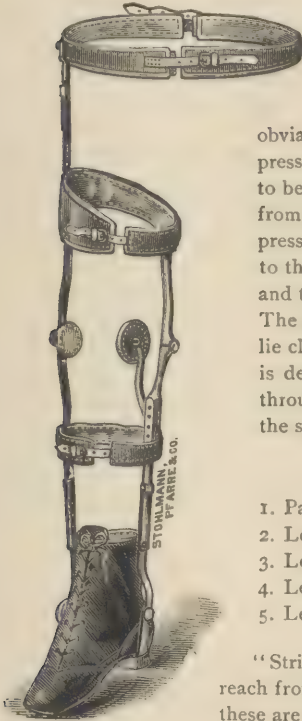
1. Length from sole to ankle joint, Inches.
2. Length from sole to garter (below knee), "
3. Length from sole to centre of knee joint, "
4. Length from sole to perineum, "
5. Circumference above ankle joint, "
6. Circumference at garter (below knee), "
7. Circumference at middle of thigh, "
8. Circumference of thigh at perineum, "
9. Send us a pair of well-fitting lace shoes.

ORTHOPÆDIC.

PARALYTIC, SPASTIC AND RACHITIC DEFORMITIES.

Genu Valgum or Knock Knee. Apparatus.

FIG. 4221.
Wilcox's Genu Valgum Brace.



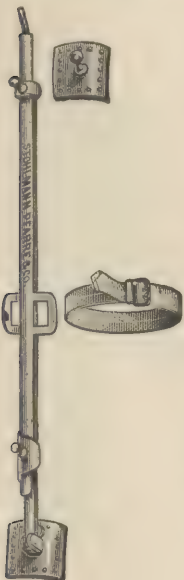
"The method of applying pressure to the knee is the peculiar feature of this brace. In most braces the pressure is made by means of straps which pass around the knee and are attached to the outside bar, for the purpose of drawing the knee outward. The trouble is, however, that these straps, passing around the leg, make pressure on the vessels and nerves in the popliteal space, which pressure cannot be endured to a sufficient degree by the patient to make the strap accomplish the purpose for which it was designed. The attempt has been made to obviate this difficulty by making the straps cross on the inner side of the joint where the pressure is desired, and the straps run diagonally above and below the popliteal space to be attached to the outer bar. The brace which I offer makes only a *pushing* pressure from the inside bar and has no constricting bands whatever running around the limb. The pressure is made by a concave pad, placed opposite the inner side of the joint and attached to the inner bar by means of a very stiff steel spring. The connection between the pad and the spring is a ball and socket, so that the pad always accommodates itself to the knee. The spring is attached to the inner bar of the brace, working in a slot, so that the pad can lie close up against the bar or projected to some distance from it, as more or less pressure is desired. The pressure is regulated by means of a small screw which, being passed through the bar and spring at a higher or lower hole, increases or decreases the angle of the spring with the bar."—SIDNEY F. WILCOX, M. D.

DIRECTIONS FOR MEASUREMENT.

- | | | |
|--|---------|-------------------------------------|
| 1. Patient's name and age. | Inches. | 6. Circumference of pelvis, Inches. |
| 2. Length from sole of foot to ankle joint, " | | 7. Circumference of thigh, . " |
| 3. Length from sole of foot to knee joint, " | | 8. Circumference of leg, . . " |
| 4. Length from sole of foot to hip joint, " | | 9. Right, left, both feet. |
| 5. Length from sole of foot to iliac crests, " | | |

"Strips of strong adhesive plaster are cut about two inches wide and of sufficient length to reach from the external malleolus to the top of the great trochanter. To add to their strength, these are backed by strips of non-elastic webbing, about an inch in width, which are sewed fast to them throughout their entire length. One of these strips is applied to the skin, beginning on the outer aspect of the leg, about midway between the ankle and knee joints. It is passed obliquely forward, upward and to the inner aspect of the knee joint. From thence it is passed over the prominent internal condyle of the femur obliquely backward, upward, and to the outer aspect of the thigh to a point midway between the knee and the hip joints. The application of the second strip is begun at the last-named point on the outer aspect of the thigh, and is passed obliquely forward, downward and to the inner aspect of the knee joint. Here it passes over the prominent internal condyle of the femur and directly across the strip which was first applied. From thence it is passed obliquely downward, backward and to the outer aspect of the leg, the starting-point for the first strip. The ends of the two strips, which meet and cross each other on the outer aspect of the thigh, are sewed together; likewise the ends of the two strips meeting and crossing on the outer aspect of the leg are sewed together. A strip of adhesive plaster, passed directly around the thigh, holds the upper ends of webbing in position, while a similar strip about the leg maintains the lower ends in place. At each of the points on the outer aspects of the thigh and leg a piece of sheet metal, perforated with small holes, is sewed to the ends of the strips of adhesive plaster and webbing. The mechanism for continuously exerting force in opposite directions is the same as described on page 660, for Fig. 4097. The ends of the sliding rods are now passed into the staples on the square metal plates and by means of the elastic webbing tension is kept up, and a corrective force continuously exerted to overcome the in-knee deformity. A bandage is placed over all the strips which have been applied to the limb, or instead light silk elastic stockings. A broad piece of webbing, provided with a buckle, is passed around the limb and through a perforated flange attached to one of the bars at a point opposite the knee joint. This completes the dressing. The other leg is treated in the same manner."—M. J. Roberts, M. D., in *New York Medical Monthly*, June, 1886.

FIG. 4222.—Roberts' Genu Valgum Brace.



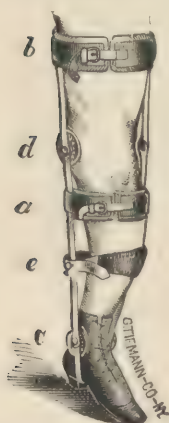
ORTHOPÆDIC.

PARALYTIC, SPASTIC AND RACHITIC DEFORMITIES.

Genu Varum or Bow Leg. Apparatus.

"Genu Varum or Bow Legs.—This deformity consists in a bending of the legs outward. In these cases the external lateral ligaments give way. The deformity is almost always dependent upon softening of the bones; hence bow-legged children are usually those who have some constitutional disease. The deformity is really dependent upon some cachexia or diathesis; and the disease chiefly productive of the condition is rachitis. The treatment, therefore, which is necessary in such cases is both local and constitutional. Locally, some kind of mechanical apparatus will be necessary to bring the legs into the proper position and hold them there. Constitutionally you are to resort to such remedies as give support to the system, such as cod-liver oil, &c., but the lactate and phosphates of lime are the most important."—*"Orthopædic Surgery and Diseases of the Joints.* Lewis A. Sayre.

FIG. 4223.
Bow Leg Braces,
with Thigh Band.



The chief cause of this deformity is thought to be an insufficient supply of food, or the supply of improper food—impaired nutrition. The mechanical treatment is very simple.

1. The bones in a softened condition, yielding under the weight of the body, must be assisted by extraneous help; 2. The arched bones must be restored to their normal condition. The instrument illustrated by the cut answers the purpose admirably.

The support is given by double stems of steel (secured to a shoe) carried up as high as the thigh—jointed at the ankle and knee to allow the patient perfect freedom of motion. They are kept in place by calf (a) and thigh bands (b). The bow is corrected by pads (c) and (d) being placed respectively against the ankle and knee on the concave side of the limb, whilst an elastic strap (e), passed around on the highest point of the arc, inside of the outer stem, tightly buttoned to the steel bar on the concave side, gradually compels the leg to become parallel with it.

In slight cases, or when the bow is greatest below the calf, an instrument carried up to d is sufficient. To insure a good fit, in ordering the apparatus, send the following description and measurements:

DIRECTIONS FOR MEASUREMENT.

1. Patient's name or sex.
2. Patient's age.
3. Length from sole of foot to ankle joint (c), Inches.
4. Length from sole of foot to knee joint, inner side (d), "
5. Length from sole of foot to knee joint, convex or outer side (d), "
6. Length from sole of foot to upper third of thigh, inner side of leg (b), "
7. Length from sole of foot to highest point of the arc (e), "
8. Circumference of calf (a), "
9. Circumference of thigh (b), "

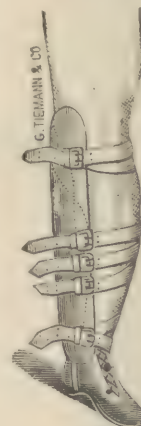
FIG. 4224.
Short Bow Leg Brace.



This apparatus has only one upright bar, having a joint at the ankle and pads at the knee- and ankle-joints. This steel bar is fastened to the shoe and placed on the inner side of the leg, where it is secured by a well padded band passing around the garter. A wide bifurcated band passes around the curved part of the leg and is fastened from two sides on buttons placed on the steel bar for this purpose. Measurements required are the same as for Fig. 4223.

Bigg's bow leg brace "is the simplest, and consists of a padded piece of wood, placed on the inner side of the leg, and extending from the internal malleolus to a point just above the internal femoral condyle; it is, therefore, a base opposed to the convexity of the curve. A long strap webbing is passed several times around the leg, so as to embrace both splint and tibia, which, by compression, tends to diminish the arc of curvature. This splint acts imperfectly unless secured to the heel of the patient's foot by a metal socket, which has the effect of preventing the splint sliding around the leg—a thing which will happen in spite of the greatest care, unless the shoe and splint are mutually connected. For this purpose a small piece of metal is fixed to the lower edge of the splint, which is inserted by a tubular socket into the heel of the shoe."—HEATHER BIGG.

FIG. 4225.—Bigg's
Bow Leg Brace.

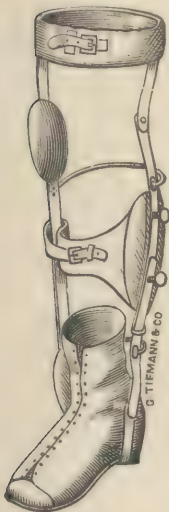


ORTHOPÆDIC.

PARALYTIC, SPASTIC AND RACHITIC DEFORMITIES.

Genu Varum, Bow Leg. Apparatus.

FIG. 4226.—Gross' Bow Leg Brace.



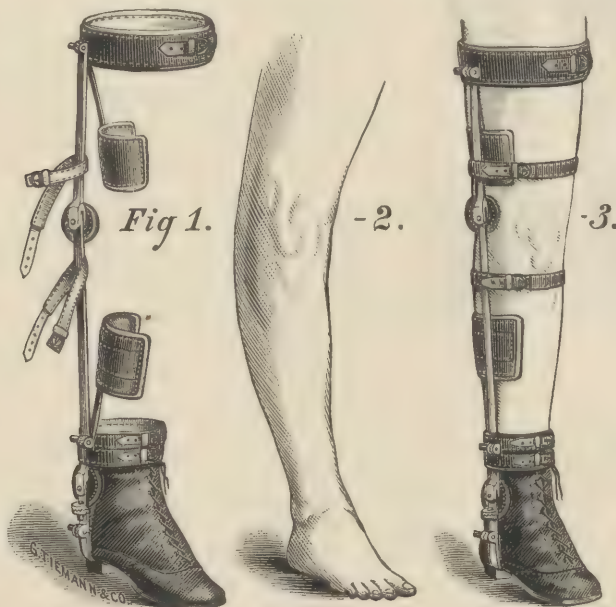
"The immediate cause of bowed leg is softening of the osseous tissue, from defect of earthy matter. This may depend either upon rachitis or upon some other vice of the constitution, the precise nature of which cannot always be determined. The existing circumstances are two: contraction of the muscles pulling the affected bones out of shape, and the weight of the body compelling them to bend under the superimposed pressure. In rachitis the curvature is frequently attended with actual shortening; the latter defect, however, often exists without the former, the pieces in which it is most marked being perfectly straight.

"The treatment must be early and decided. If it be postponed until the completion of the ossific process, it will be in vain to hope for relief. The general health, if at fault, must be amended by appropriate remedies; walking and standing must be interdicted, and the limbs must be supported by suitable apparatus, applied in such a manner as to make efficient counter-pressure opposite the seat of the excurvation. The more simple forms of the lateral variety will generally yield to a light, well-padded wooden splint (Fig. 4225), stretched along the inside of the leg and inserted by a tubular socket into the heel of a laced shoe. In the more severe grades of the affection nothing will be found to be more efficient than the apparatus delineated in the above cut."—"System of Surgery." Gross.

The measurements required for Fig. 4226 are the same as directed for Fig. 4223.

FIG. 4227.—Stillman's Bow Leg Brace, long.

FIG. 4228.—Stillman's Bow Leg Brace, short.



"These braces exert a constant spring force, which tends to overcome the deformity gradually. It is adjustable by means of a ratchet and key, and is very effective, for not only does it support the limb while the deformity is being reduced, but the ratchets at the lower extremity of the instrument allow the surgeon to control the position of the feet at the same time. Sometimes, when the curve is below the knee, the short brace only (FIG. 4228) is needed."—CHAS. F. STILLMAN, M. D.

The measurements required for Figs. 4227 and 4228 are the same as directed for Fig. 4223.

ORTHOPÆDIC.

PARALYTIC, SPASTIC AND RACHITIC DEFORMITIES.

Genu Varum, Bow Leg, Bowed Tibia. Apparatus.

This apparatus consists of: 1, a cap made of gutta percha, to fit the leg at the apex of the bow; 2, a bowed spring, the size and strength of which must be suited to each individual case.

Application.—The apex of the curve of the spring (resting on the gutta-percha cap) is applied to the apex of the deformity, and the spring then bound down with roller bandage. As the inclination of the spring is to return to its original shape, it tends to straighten the bow of the bone. These springs must be reapplied as often as they get loose.

FIG. 4230.
Bruce's Bow Leg Apparatus.



"This apparatus consists of three pieces, with joints corresponding to the ankle and knee, and is placed upon the inner aspect of the limb. It is made of very light pieces of steel. The first segment of the instrument extends from the sole of the shoe to the ankle joint, and is riveted directly to the sole of the shoe in front of the heel. The second segment of the instrument is a narrow strip of stiff steel, having a curvature in the opposite direction of the deformity. The third segment extends a short distance above the knee joint, and is provided with a curved piece, riveted at right angles to the shaft of the instrument. A roller-bandage is carried about the leg and over the instrument, the latter being drawn up close to the limb, as shown.

"The curved shaft of the instrument being made of spring steel, and tempered, when straightened out and drawn close to the limb gently tends to return to its former curved form. The pads attached to the instrument opposite the ankle and knee joint serve as points of counter-pressure. This apparatus is to be worn day and night, but should be removed each day in order to manipulate the muscles, as the prolonged wearing of bandages, even though the patient exercises considerably, is likely to cause more or less muscular atrophy."—From a Clinical Lecture, December 18, 1886, by M. J. Roberts, M. D.

The same measurements are required as for Fig. 4231.

FIG. 4229.—Harris' Bow Leg Spring

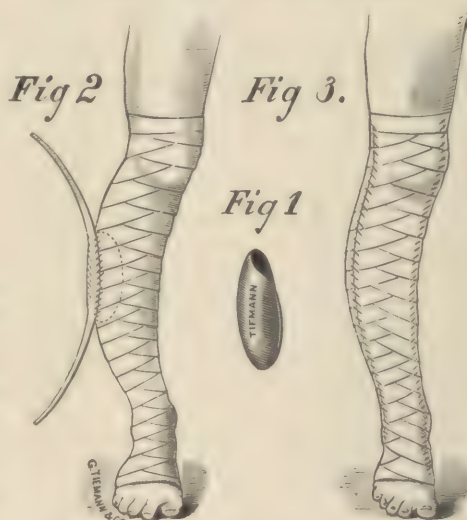
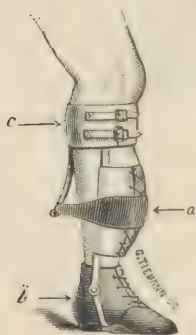


FIG. 4231.—Brace for
Correcting Anterior
Curvature of the Tibia.



Anterior Curvature of the Tibia. Apparatus.

This cut is a fair representation of the instrument. It consists of two upright steel stems, fastened below to a shoe and terminating above in the calf-band. The deformity is corrected, either by passing a leather bandage around the stems and tightly lacing it in front over the arc of the curvature, *a* (HEATHER BIGG), or by a strap passed over the arc of the curvature and fastened to a spur suspended from the calf band behind, *c* (TIEMANN). The points of resistance being in either case the heel of the shoe, *b* and the posterior trough of the calf-band, *c*. In ordering the apparatus, send a shoe and the following particulars and measurements:

1. Brace for Anterior Curvature of the Tibia, Fig. 4231.
2. Patient's name (or sex).
3. Which foot?
4. Length from sole to ankle joint, Inches.
5. Length from sole to calf (*c*), "
6. Circumference of calf, "
7. Length from sole to knee joint, "

ORTHOPÆDIE.

PARALYTIC, SPASTIC AND RACHITIC DEFORMITIES.

Genu Valgum, Varum, Bowed Tibia, &c. Treatment.

"Knock knee and bow leg, for the most part, are due to rickets, and, therefore, considerable is to be expected from medicinal measures toward effecting a cure. Dr. Gibney then spoke of climatic influences and the use of phosphates of lime and soda in the treatment of rickets, and expressed the opinion that the latter were satisfactory only as they improved digestion and general nutrition.

"In what cases should manual force and retentive splints be resorted to? In the first place, in those patients whose parents are unable to buy an apparatus or too improvident to give any attention to the correction and cure of the deformity. Second, when one has but little time to effect a cure. Third, where the bones will yield readily to such force, the other conditions being present. Dr. Gibney quoted upon this point the conditions reached by McEwen, that it may be safely concluded that *brisement forcé* has served its time, and cannot be practised in the presence of the more exact methods of the present day. From his own experience and from the drift of sentiment, he felt well assured that McEwen's conclusions would be more strongly supported at the close of 1884 than they were at the end of 1883 in the treatment of genu valgum.

"With reference to apparatus, Little, of London, was an advocate of mechanical appliances, while McEwen, of Glasgow, was opposed to their use.

"So far as bow-legs are concerned, Dr. Gibney had been guided in their treatment by the principle that, if the bones could be sprung into position by the use of a moderate amount of force, a retentive apparatus, consisting of springs, could be applied with benefit. If the femur is curved and the inner condyle unusually long in a case of knock-knee, he tests with his hands the ligaments of the knee and the femoral curve, and is guided by the result in his selection of cases for apparatus. The age beyond which he found this test failing was four and five years.

"All springs now in use are constructed upon one principle, namely, force brought to bear against the convexity of the curve at its apex. Dr. Little, of London, applies continuous pressure; Dr. Shaffer, of New York, employs momentary pressure; Dr. Poore, of New York, reports that about thirty per cent. of the cases of genu valgum are cured by mechanical appliances."—*Medical Record*, November 29, 1884.

"When the deformity has been neglected and cannot be overcome by appropriate apparatus, and the person is badly crippled or unable to walk, the only resource is osteotomy. The division of the tibia may be effected subcutaneously with the chisel, saw, trephine, or the dentists' drill, the point of greatest convexity of the bone being selected for the purpose, and care taken not to interfere with any important bloodvessel. The fibula may be divided in a similar manner, or broken by forcible flexion. The limb is at once placed in a suitable apparatus, or, what is generally preferable, plaster dressing. The statistics of this operation, published within the last ten years, are of an eminently gratifying nature. Occasionally serious symptoms follow, and instances have been recorded in which death ensued from erysipelas, pyemia or diffuse abscess."—"System of Surgery." Gross.

"The operative procedures may be divided into five, viz.: 1, tenotomy and gradual reduction; 2, forcible reduction; 3, osteotomy; 4, osteoclasy; 5, epiphysal chondrotomy. There is external wound only in tenotomy, osteotomy and chondrotomy; but the first is subcutaneous and the second practically so."—"Practical Orthopædics." Reeves.

"For the relief of genu valgum, Ogston, in May, 1876, made section of the internal condyle by passing an Adam's saw from its upper border down into the joint, and then gliding the inner condyle up on a level with the external condyle. This operation, under the antiseptic precautions, has been repeatedly performed with marked success. Dr. McEwen, on May 10th, 1878, modified the operation by removing a wedge-shaped piece of bone from the internal condyle, the apex of which did not quite reach the encrusting cartilage of the joint, while its base lay at the upper part of the internal surface of the condyle. On its removal with the chisel the leg was forcibly brought into a straight line, and the two surfaces of the gap brought into approximation with each other, thus raising the internal condyle to a level with the outer condyle. He also made section of the femur, transversely, with a chisel, to the extent of two-thirds of its diameter, about half an inch above the epiphysal cartilage, then forcibly bringing the limb straight. Mr. Reeves of London Hospital, modified the operation by driving a chisel into the internal condyle in the line of Ogston's operation, but not quite down to the cartilage of incrustation, and then forcibly straightening the limb, fractured off the condyle without opening the joint.

"All these operations are attended with more or less danger, and should be avoided, if possible; and, in my own experience, I have always been able to secure entirely satisfactory results by the various simple methods already described."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre.

"In cases in which the deformity is *severe* or of *long standing*, and especially in rachitic and severe statical cases—always granting that the eburnating stage has occurred, or is taking place—we must resort to more radical measures, after giving fair trial to the means already mentioned."—"Practical Orthopædics." Reeves.

"The instruments requisite for an osteotomy are few. It may be performed with a saw, chisel or osteotome. Osteoclasy consists in breaking the bone or bones (without external wound) with an osteoclast."—"Osteotomy and Osteoclasis." Poore. (See pp. 110 to 114.)

ORTHOPÆDIC.

PARALYTIC, SPASTIC AND RACHITIC DEFORMITIES.

Genu Valgum, Varum, Bowed Tibiæ, &c. Operative Plans.

"Osteotomy may be linear, cuneiform, rounded, &c.; the former plan only deserves the name of osteotomy, for the latter are really osteectomies, as a portion of bone is removed. Osteotomy may be *complete*, as when the whole thickness of the bone is cut through, or *partial*, as when only three-quarters or four-fifths of it are severed and the rest broken. This is the usual method in operating for genu-valgum, varum and in curved tibia and fibula. The other methods of osteotomy have been used for mal-union of fractures, bony ankylosis of hip, knee, elbow, &c.

"There are thirteen different operative plans for genu valgum and varum, which may be tabulated thus:

OSTEOTOMY OF FEMUR.

- | | |
|--|---------|
| 1. Condylotomy with saw (linear, complete), | Ogston. |
| 2. Condylotomy with chisel (linear, incomplete), | Reeves. |
| 3. Supra-condylar (linear <i>internal</i> , incomplete), | McEwen. |
| 4. Supra-condylar (linear <i>external</i> , incomplete), | Reeves. |
| 5. Diaphysial (linear <i>external</i> , incomplete), | Reeves. |
| 6. Epiphysial chondrotomy (may be done), | Ollier. |

OSTECTOMY OF FEMUR.

- | | |
|---|------------|
| 7. Bicondyloid (really a partial excision), | Annandale. |
| 8. Cuneiform of internal condyle, | Chiene. |
| 9. Cuneiform of internal condyle, | McEwen. |

OSTEOTOMY OF TIBIA.

- | | |
|------------------------------------|-----------|
| 10. Linear (incomplete), | Billroth. |
|------------------------------------|-----------|

OSTECTOMY OF TIBIA.

- | | |
|--------------------------|--------|
| 11. Cuneiform, | Meyer. |
|--------------------------|--------|

ON TIBIA AND FIBULA.

- | | |
|---|---------|
| 12. Osteectomy (cuneiform) of tibia, and linear complex osteotomy of fibia, . . . | Schede. |
|---|---------|

ON FEMUR AND TIBIA.

- | | |
|---|----------|
| 13. Linear osteotomy incomplete), | Barwell. |
|---|----------|

"Osteotomy is an old operation, for Hippocrates recommends it for badly united fractures, and it was practiced in the time of Paul of Egina. Albucasis, a little later, wrote in favor of the use of the saw in preference to refracturing badly united bones. Cucherilli* says he also recommended osteotomy in ankylosis consecutive to juxta-articular fractures. Many centuries elapsed before the question was revived, but this is not the place to write a history of osteotomy in general, therefore I will refer those interested in this matter to the work of McEwen, and especially of Camperon, on Osteotomy. Some historical references of more recent date will be found in Dr. Little's work on *in-knee* distortion.

"I will only briefly refer to the history of those methods which have application to *orthopædic practice*. Déschamps used cutting forceps for correcting a badly united fracture. In 1815 Lemerrier excised the ends of the tibia for vicious callus. In 1816 Wasserführ did the first linear osteotomy with open wound for badly united fracture of the femur in a child; in 1826 Riecke and Rhea Barton performed osteotomy in the femoral neck and trochanter for ankylosed hip; and in 1835 he did cuneiform osteotomy for ankylosis of the knee, and was speedily followed by Kearney Rodgers. In 1834, Clémont,† of Rochefort, instituted cuneiform excision of vicious callus, and was followed, probably quite independently, by Rhea Barton. These operations were all by open wound, and the saw or forceps, or both, were used.

"In 1840, Jobert de Lamballe performed the first osteotomy for rachitic curvature, and in 1847 Maisonneuve did the first osteotomy (in France) for ankylosis of the hip. In 1854 *subcutaneous* osteotomy was first practiced by Meyer and Langenbeck for mal-union of fractures and rachitic curves (first suggested by Malgaigne in his work on fractures and dislocations, 1847). The operation was done in America by Brainard, 1854, and by Pancoast, 1859, and became popular for a time. In 1850 to 1851, Meyer, of Würzburg, performed the first osteotomy for genu valgum.

* "Lo Sperimentali," May, 1878.

† *Gazette Médicale de Paris*. 1834, page 347.

ORTHOPÆDIC.

PARALYTIC. SPASTIC AND RACHITIC DEFORMITIES.

Genu Valgum, Varum, Bowed Tibiæ, &c. Operative Plans.

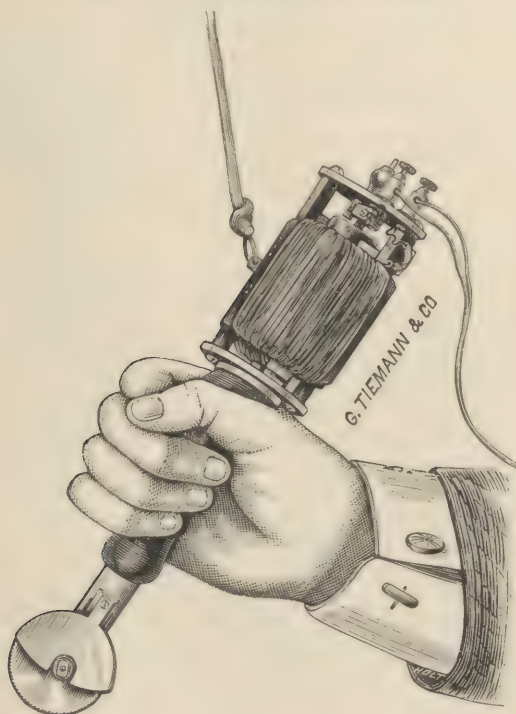
"In 1852 Langenbeck proposed osteotomy in two cases of ankylosed knee. His plan was to perforate the bone in two places with a drill and to pass a fine saw into one of the holes and saw through the intervening part of bone, then to break the bone. In 1859 Pancoast perforated the femur in six places through a single subcutaneous opening, just above the knee, for ankylosis, and Brainard repeated the operation in 1860. In 1862 Sayre operated for ankylosed hip; in 1868, Stromeyer Little operated with a chisel for ankylosed knee; Brodhurst, in 1865, performed subcutaneous osteotomy; and, in 1869 and 1871, Adams did subcutaneous section of the femoral neck for bony ankylosis of the hip, and was soon followed by Gant, Maunder and Reeve. It was not till 1875, encouraged by the *antiseptic method*, that Annandale excised a portion of the femoral condyles for genu valgum. Ogston operated in May, 1876, by a small wound, using a saw; he was followed by Schede in September of the same year. In this method the joint was opened under strict antiseptic precautions; but *antiseptic osteotomy* was introduced by Volkmann, of Halle, for ankylosis of knee in 1875, and the first operation of this kind in Great Britain was by McEwen, of Glasgow. Billroth introduced the use of the chisel in 1870, and in 1873 did non-antiseptic linear osteotomy of the tibia; in 1872 for genu varum, and in 1873 for genu valgum.

"Schede, of Berlin, did cuneiform *osteotomy* of the tibia and osteotomy of the fibula for knock-knee in 1876. In 1877 Chiene, of Edinburgh, did cuneiform osteotomy of part of the internal condyle, and in 1878 McEwen chiselled out a wedge of the inner condyle along Ogston's line. Ogston's, Chiene's and McEwen's cuneiform operations have been termed *osteo-arthrotomy*, or *inter-articular osteotomy*. In the same year Barwell performed 'simultaneous multiple osteotomy' for knock-knee; and in 1879 Reeve introduced an operation in which he used a chisel, and termed it *extra-articular osteotomy* or *condylotomy*, the object of which was to avoid entering or doing serious damage to the joint, and at the same time to loosen and properly replace the displaced condyle."—"Practical Orthopædics." Reeves.

CUNEIFORM OSTEOTOMY FOR ANTERIOR CURVATURE OF TIBIA AND FIBULA.

"Knock-knee, bow-leg and anterior-tibial curvature have of late years been the subject of much study by European surgeons; and renewed interest has been awakened in all parts of the world on account of the operative procedures which have been instituted for the correction of these deformities.

FIG. 4232.—Roberts' Electro Osteotome.



"My instrument consists of a small electro-motor, supplied with electricity through insulated wires from a powerful primary zinc carbon battery, and carrying a circular saw that revolves in a plane parallel with that of the central shaft. A hollow cylinder is firmly screwed to the end plate of the motor. Upon this a soft rubber hand-piece, fashioned like that of a carpenter's chisel, is slipped and fastened in position, forming the handle of the instrument. The central shaft of the motor is continuous through the hollow cylinder. At its distal end a right-angle miter-gearing connects it with the saw-bearing point. A metal shield guards the proximal aspect of the serrated blade. Upon the outer end of the motor to which the hand-piece is attached are two binding-posts, which receive the insulated wires connecting the instrument with the battery.

"When using the electro-osteotome it is suspended by a solid rubber cord, six or seven millimetres in diameter, from the cross-bar of an adjustable crane screwed to the edge of the operating table. In this way all weight is removed from the hand of the surgeon, leaving the instrument as thoroughly at his command as if it were a delicate probe. A switch is attached on the top of the motor, so that it can be opened and closed at pleasure. This increases the independence of the operator, for the instrument is not set in motion until the desired moment, when, by the use of his free hand, the operator *closes* the circuit by means of this switch. Upon completing a section of bone, the operator can *open* the circuit by means of the switch and *stop* the instrument.

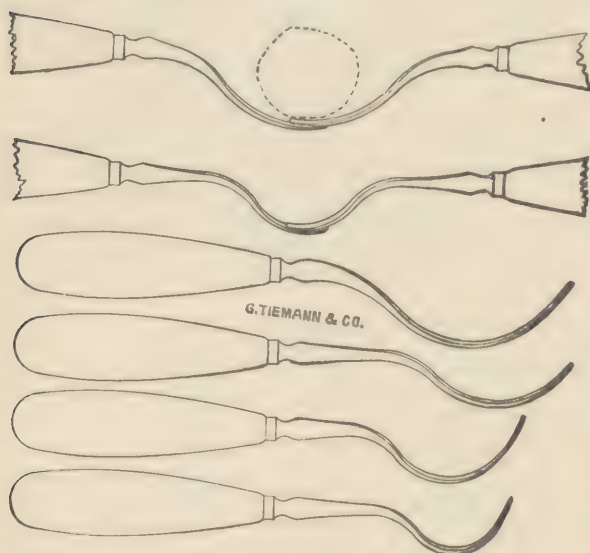
ORTHOPÆDIC.

PARALYTIC, SPASTIC AND RACHITIC DEFORMITIES.

Genu Valgum, Varum, Bowed Tibiæ, &c. Operative Plans.

"It makes no difference which side of the bone you approach, as with the osteotome you can cut out a wedge-shaped segment commencing at the base, at the side, or at the apex of the wedge. Therefore, in operating, you have only to take into consideration the most direct and safest route to the bone. As the fibula lies on the outer aspect of the tibia and would be in the way of reaching the latter bone from this side, the incision is made on the inner and anterior aspect of the tibia. Having made a clean cut incision down to the bone, the soft parts on either side of the incision are picked up with a pair of dressing forceps, and the cellular tissue between them and the bone is divided with a scalpel so as to admit, without the use of undue force, the end of a protecting retractor (Fig. 4233), which is placed between the soft parts and the bone.

FIG. 4233.—Roberts' Protecting Retractors.



"The first two retractors illustrated are in pairs, while the others are single and are provided with much longer blades, which are curved up so as to serve the same purpose as a pair of retractors with shorter curves. The single retractors are much more difficult of introduction on account of the increased length of curvature. These retractors are placed in position by passing them in around the bone, between it and the soft parts, so that when they are in position the bone lies directly upon them and the soft parts are behind them. In this way the soft parts are absolutely protected from all danger of being cut while using the circular saw of the electro-osteotome.

"The battery cells are so connected that they can be brought into the circuit for driving the motor. Two of the cells, however, are connected independently, and are designed to be used for lighting purposes. By means of the switch, however, which is connected with the motor circuit, these two cells can be cut out of the lamp circuit and brought into play for driving the motor. The switch-board is provided with two levers, by means of which in case a single cell in the battery is at fault it can be readily picked

out from the others."—"The Electro-Osteotome; a new instrument for the performance of the operation of osteotomy, and a New Form of Retractor;" *New York Medical Record*, October 27, 1883. Also "Electro-Osteotomy in Knock-Knee, Bow-Leg, and Anterior-Tibial Deformities;" *Virginia Medical Monthly*, Richmond, March, 1887. M. J. Roberts, M. D.

DEFORMITIES OF THE FEET.

"The human foot, in its *natural* state, is one of the most beautiful examples of a complicated machine, combining great strength with graceful mobility: consisting as it does of twelve bones (in addition to those of the toes), jointed to each other by regularly constructed articulations, admitting of motion to a greater or less degree of each individual bone—so that no restraint can be put upon these slight movements between the various bones without destroying the harmony of their combined action in the foot as a whole—and at the same time being so firmly bound together by ligaments, and sustained in position by tendons attached to strong muscles, as to give it an abundant security to bear the superincumbent weight of the body, while it allows of sufficient expansion and extension for ease and elasticity in locomotion. It is connected with the leg at the astragalo-tibial articulation, and prevented from *any lateral* movement by the projecting malleoli on either side, which fit so closely to the sides of the astragalus as to permit of no motion at this joint except that of flexion and extension, or that of pointing the toes up or down. Turning the toes out or in is produced by rotation of the thigh and leg at the hip joint, or by the revolving motion of the fibula produced by the contraction of the biceps and tensor vaginae femoris when the knee is flexed.

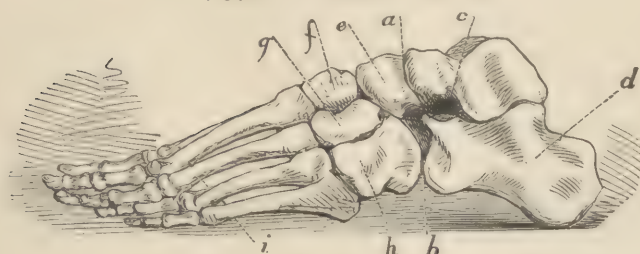
"Having stated that no motion can occur at the tibio-tarsal or ankle joint, except *flexion* and *extension*, and that the pointing of the toes out or in is done by the muscles of the hip, it follows, as a matter of course, that all the other motions of the foot, such as twisting the sole inward or outward, raising or depressing the arch, &c., must occur between the joints of the other eleven bones of the foot. The toes, being merely attachments, are not considered as having any influence in these motions.

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DEFORMITIES OF THE FEET.

The Normal Human Foot.

FIG. 4234.—The Bones of the Foot.



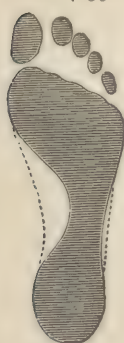
- a, b.* The medio-tarsal articulation.
- c.* The astragalus.
- d.* The os calcis.
- e.* The scaphoid.
- f.* Middle cuneiform.
- g.* External cuneiform.
- h.* Cuboid.
- i.* The metatarsal bones.

"If we carefully examine the foot, as seen in the figure, we shall observe that, between the os calcis and astragalus behind, and the cuboid and scaphoid in front, is the *medio-tarsal* joint, *a, b*, going completely across the foot, dividing it into an anterior and posterior portion, admitting in a limited degree of every variety of motion—flexion, extension, abduction and adduction, as well as rotation inward and outward upon the long axis of the foot. I desire to call particular attention to this compound articulation in the tarsus, because, by a most remarkable oversight of surgeons, the very important part which it plays in deformities of the feet has, until very recently, been entirely unnoticed.

"The foot, as a means of support, rests upon three buttresses: the heel behind, which is stationary; and the first and fifth metatarso-phalangeal articulations in front, which are slightly movable, capable both of expanding and extending, thereby increasing the base of support which adds to the security of the body, and by this very expansion and extension of the anterior pillars or buttresses, gives elasticity in locomotion. Between these three pillars, or points of base, spring two arches; one from the heel, reaching to the anterior two pillars, narrow behind and wider in front, called the antero-posterior arch; and one from the two pillars arching across the foot, called the transverse arch. The antero-posterior arch is higher on the inner than on the outer side, and cannot be brought to the ground in the normal condition; whereas, the outer line of the arch is always brought to the ground whenever the weight of the body is borne upon it.

"Let anyone dip his naked foot in a pail of water, and then, while wet, stand with it upon a dry board or piece of brown paper, and he will get an exact impression of the parts of the foot which will come in contact with the earth in supporting the weight of the body. In Fig. 4235 it will be seen that the outer line of the arch touches its entire length, which thus gives it a firm and extensive base of support, whereas the inner line only touches the ground at its two extremities, the central part of the arch on the inner side being retained in position by the *tibialis-anticus* muscle, which is inserted into the inner and under surface of the internal cuneiform and base of the first metatarsal bones. It will, therefore, be seen that the strength and perfection of this arch are greatly dependent upon the condition of the anterior-tibial muscle. The importance of understanding the construction and retention of this arch will be more fully seen when we come to study the *deformities* of the foot, more particularly *talipes valgus*, or flat-foot."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre.

FIG. 4235.



KYLLOSIS, CLUB-FOOT, TALIPES.

The Morbid Alterations in the Form of the Foot.

"*Kyllosis* (κυλλος, crooked, lame), *cyllosis*, *kyllopodia*. Professor Chaussier so calls congenital distortion of the feet, *club-foot*, *polt-foot*, *stump-foot*; (Prov.) *pommel-foot*, *pummel-foot*; *talipes*; (F.) *pie-d-bot*."—DUNGLISON.

"Under the term *talipes* (Latin, *talus*, ankle, and *pes*, foot) are included all deformities in which there is a permanent deviation from the normal relations of the foot to the leg, or of the parts composing the arch of the foot to each other, whether this deviation consists in flexion, extension, inversion or eversion. *Talipes* is usually described under four distinct heads, namely: *talipes equinus*, *talipes calcaneus*, *talipes varus* and *talipes valgus*.

"Typical examples of any of these varieties are rare, for nearly always the deformity is a combination of two varieties. When we wish to designate such a deformity the names of the two component distortions are combined, the more important always being placed first. Thus, when we have a combination of equinus and varus, it is styled equino-varus or varo-equinus, according as the equinus or varus is the more prominent, and the same principle of nomenclature is used for calcano-varus and valgus.

"In addition to the above-mentioned varieties, there is one known as *talipes cavus* or *plantaris*. This is a very frequent complication of other varieties of *talipes*. When it is present as a complication it does not, as a rule, enter

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the name of the deformity. When, however, as occasionally happens, the case presents no other deformity than that caused by the contraction of the plantar fascia, the name talipes cavus or plantaris is used. The deformity known as *flat-foot*, I think, should be considered as a variety of valgus, as the peculiar breaking down of the arch is the same in both, and the two affections are very generally associated."—SAYRE.

Talipes Equinus.

FIG. 4236.—Talipes Equinus.



FIG. 4237.—Talipes Equinus.



"*Talipes equinus* receives its name from the position of the foot, simulating the hoof of a horse. The deformity consists in the raising of the heel and dropping of the anterior portion of the foot, so that the weight of the body is borne upon the metatarso-phalangeal articulation alone, instead of upon the three points above spoken of. The convexity of the arch of the foot is generally very much increased; and the concavity of the arch becomes more and more angular in proportion to the degree of the deformity. The toes are extended upon the foot, and the foot is extended upon the leg. Sometimes the foot is so much extended as to make almost a straight line upon the tibia. The peculiarity in the deformity is usually associated with a paralyzed condition of the extensor muscles of the toes. Ordinarily, however, if these muscles possess the power of contraction, they voluntarily contract and elevate the toes sufficiently to enable the patient to walk upon the base of the metatarsal bone of the great toe, as seen in Fig. 4236. When the paralyzed condition referred to is present, there is absence of power for lifting the toes, which necessitates the use of crutches when the patient walks.

"*Talipes equinus* may be either congenital or acquired. The deformity much more frequently occurs under the form of equino-varus or varo-equinus. *Talipes equinus* may be paralytic or spastic; or the spastic condition may be developed upon the paralytic. The latter condition may be developed by long-continued walking upon the deformed parts, thereby exciting inflammatory action, and when present will require tenotomy before a cure can be effected. If the deformity is purely paralytic it can be overcome by the application of mechanical means and elastic force, which shall take the place of the paralyzed muscles, until, by the use of electricity, friction, strychnia, &c., they have been restored to the power of proper contraction. The paralytic variety is easily recognized, from the fact that the foot can be easily restored to its normal condition; but, when the force which has restored it is removed, the deformity immediately returns. The muscles chiefly affected in the paralytic variety are those upon the anterior aspect of the leg. On the contrary, when the equinus is spastic, it is due to abnormal contraction of the muscles upon the posterior aspect of the leg."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M. D.

Talipes Calcaneus.

FIG. 4238.
Talipes Calcaneus.



"*Talipes calcaneus* is that variety of deformity where the anterior portion of the foot is elevated and the heel is depressed. It is frequently seen as a congenital deformity, and all cases which have fallen under my observation have been of a paralytic nature. This deformity is much more liable to occur complicated with varus or valgus than to present itself uncomplicated. When paralytic, the muscles chiefly affected are the gastrocnemius and soleus; and in the treatment to be adopted the application of artificial muscles to take the place of the paralyzed gastrocnemius and soleus forms an essential element.

"*Talipes calcaneus* is very often acquired. It may result from jumping, wrestling or the application of any force sufficient to rupture or cut the tendo-achillis. It occurs again as the result of injuries received upon the anterior portion of the foot. A very common cause in this connection is a cicatricial contraction following burns. The gradual contraction of the cicatricial tissue overcomes the action of the gastrocnemius and soleus muscles, and, as a consequence, the anterior portion of the foot becomes elevated and the heel depressed. In all such cases, therefore, it is an exceedingly important point in their management to *prevent* this contraction during cicatrization, and thus prevent the deformity. It is important to keep the foot as forcibly extended as possible. By this measure you materially delay the cicatrization, but you promote the ultimate usefulness of the limb very essentially.

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"Extend the ulcerated surface as far as you can, and let it heal as slowly as possible. This is one method of management, and the one ordinarily employed, until another step had been taken. By the old method cicatrization was allowed to go on from circumference to centre until the whole granulating surface had been closed in, which was usually an exceedingly tedious process. Now the surgeon transplants a number of little islands of skin to the granulating surface, and from each of these little islands new skin grows and spreads. The wound heals by cicatrization, as before, but it is from the new bloodvessels formed, giving us a far different cicatrix from that obtained by the process of granulation. The cicatrix is much more yielding, is softer, and less liable to contract. The same principle is applicable in the treatment of extensive burns about any of the joints, or involving the palmar fascia. * * * If you succeed in restoring the deformed parts to their normal position, some artificial apparatus must be applied and the application must be kept up until the patient can voluntarily flex and extend the foot in the normal manner.

"*Prevention of deformity* is, therefore, an essential part in the management of all injuries affecting the anterior portion of the foot, but especially burns. When the tendo-achilles becomes ruptured from any cause, or is accidentally cut, the foot should be dressed in the position of talipes equinus, and the leg flexed upon the thigh. This position is to be maintained until the tendon is fully healed, when passive movements should be resorted to for the purpose of bringing the foot into its normal position."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M.D.

Talipes Varus.

FIG. 4239.
Talipes Varus.



"*Talipes varus* is that variety in which the foot is inverted and more or less rotated in such a manner as to bring its inner surface upward and the outer edge to a greater or less degree upon the ground. The muscles chiefly affected in the paralytic variety are the peroneals.

"This variety of talipes may be congenital, and, when combined with equinus, usually is of such origin. Combined with equinus it is one of the most common forms of deformity of the foot. When congenital it is usually of a paralytic nature, but it may be spastic as the result of some influence exerted upon the fœtus. When the deformity is acquired it is also most frequently of a paralytic nature. The most common cause, probably, is that form of paralysis known as 'infantile.'"—SAYRE.

Talipes Valgus.

FIG. 4240.—Talipes Valgus.



"*Talipes valgus* presents the converse of talipes varus, the *inner* border of the foot being downward. This deformity is much more likely to arise from traumatic causes than any other deformity of the foot. It frequently results from inflammation of the

ankle joint. It may result from a pull or wrench of the foot, causing inflammation of the peronei muscles and subsequent spastic contraction. Talipes valgus may be combined with equinus or calcaneus, making valgo-equinus or valgo-calcaneus.

"In some cases this deformity is of purely paralytic origin. This cause being unappreciated, the projecting bones which make their appearance at the front portion of the foot are very liable to be mistaken for 'diseased bones,' 'periosteal inflammation dependent upon scrofula,' &c., and are treated accordingly. These cases I regard as worthy of special consideration, and shall dwell upon them sufficiently, I trust, to make them perfectly clear. In the severer cases the deformity is so conspicuous as to be readily recognized, but the less marked cases are very liable to be overlooked. In the majority of cases this kind of trouble occurs in persons who are obliged to stand or walk for many hours in succession, thereby giving constant exercise and strain to the tibialis-anticus muscle, which supports the arch of the foot. Finally, from overwork, this muscle becomes partially paralyzed, the arch of the foot settles and valgus begins to be developed; and, as it increases in consequence of the loss of the arch of the foot, the head of the scaphoid bone begins to project, undue pressure is produced on a part of the foot not intended by nature to receive it, and inflammatory action is excited which affects the scaphoid on the inner border and also the articulations between the two cuneiform, cuboid, and the fourth and fifth metatarsal bones, and gives the patient the most exquisite and torturing pain.

"When the arch of the foot is properly supported by a healthy tibialis-anticus muscle, the articulating facets of the bones composing it press upon each other, so as to sustain the weight of the body without producing pain. The articular cartilages, having no bloodvessels or nerves of their own, are insensible to pressure; but, when the arch of

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the foot loses its proper support in consequence of a complete or partial paralysis affecting the tibialis-anticus muscle, these articulating facets no longer press upon each other equally, but are made to tilt a little, and the pressure is brought to bear upon the edges of the articular surfaces, where the supply of bloodvessels and nerves is most abundant, which gives rise to indescribable pain and suffering with every step that is taken.

"The pathology of these cases is, first, paralysis of the anterior tibial muscle; second, settling of the arch of the foot; third, abnormal pressure upon the edges of the cuneiform and scaphoid bones. The pressure in this abnormal position produces periosteal, it may be osteal or synovial, inflammation, and then it is that the case is so often regarded as one dependent upon constitutional disease.

"Now, having arrived at the true pathology, let us study their symptoms. The paralysis of the tibialis-anticus muscle can be detected by its wasted and flabby condition when compared with the same muscle upon the sound leg, or with a normal muscle when both the anticus muscles are affected. The spine of the tibia will be much more prominent than normal, the foot will be slightly abducted, and any increase of the abduction, either by traction or by bringing the weight of the body to bear upon it, causes pain at the points heretofore mentioned. Pressure with the thumb over the borders of the articulating surfaces of the cuneiform and scaphoid bones, when in the abnormal position, produces extreme pain; but when the pressure upon these borders is removed, which may be done by rotating the foot inward and raising the arch, the foot will be able to bear the weight of the body without producing pain. Usually there is *but very slight deformity* in these cases, hence they require the manipulation indicated in order to detect the precise nature of the difficulty."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M. D.

Talipes. Causes of, Treatment.

"The *congenital forms* are all due to some interference, general or local, with the normal innervation of the part. So much has been generally accepted, but the real nature of this nervous disturbance has been for the most part misunderstood.

"The prevailing treatment of talipes is based upon the theory that the pathological condition is a spastic muscular contraction. The muscles at fault, in any given case, have been considered to be those that by contraction would draw the foot into the position which it occupies. Talipes equinus is attributed to a spastic contraction of the gastrocnemius and soleus muscles; talipes calcaneus to the same condition of the anterior muscles of the leg. So, in varus, the tibial muscles, and, in valgus, the peroneals and the extensor longus digitorum, have been considered to be the seat of disease. The natural therapeutical inference from such a pathological theory was tenotomy, and it accordingly has become a *sine qua non* of treatment.

"Now, experiment and observation have fully demonstrated that, in the immense majority of cases, the pathological change is precisely contrary to that which has been believed to exist. Spastic contraction is the exception, paralysis the rule. The muscles supposed to be in a state of spasm are really contracting with only their normal degree of force, which produces an excessive effect, simply because paralysis of the opposing muscles has destroyed the natural harmony of action existing between the tractile forces which govern the motions of the foot.

"If any one doubts the paralytic nature of these *congenital* deformities, let him examine the first case he may meet within a few days after the birth of the child, and he cannot fail to mark the great ease with which the deformity can be reduced and the foot restored nearly or quite to its normal position, if he does not excite reflex contraction by too rapid and violent attempts at reduction.

"*Acquired talipes* very generally is due to the various kinds of 'infantile paralysis,' which are frequent sequelæ of scarlatina, diphtheria, dentition and many other diseases in which a blood-poisoning exists, or which are attended with great exhaustion. Very many of the cases of this sort give a history of paralysis that originally involved the whole of the lower extremities, and frequently the upper. Some cases of acquired talipes, however, are not paralytic in their character: these are occasional cases dependent upon diseases of the spinal cord, in which treatment can be of little use while the originating disease is uncured; cases following direct injury, which has caused inflammation and subsequent shortening and rigidity of muscles and fasciæ; and certain cases in which acquired spastic deformities are added to the paralytic ones previously existing. This last is a very common condition of things, and doubtless has been the chief cause in prolonging the belief in the spastic origin of most of these deformities. To apply these principles to special varieties of talipes, we must look for the disease, *not* in the muscles on that side of the leg *toward* which, but on that *from* which, the foot is distorted. In equinus, instead of the gastrocnemius and soleus being spastically contracted, the anterior muscles of the leg are paralyzed. The paralysis is often so extensive that the only retaining contractility is the extensor proprius pollicis, which, acting alone, at length produces a sub-luxation of the great toe. (See Fig. 4236.) In calcaneus, the gastrocnemius and soleus are paralyzed; in varus, the peroneals chiefly; in valgus, the tibials, and, perhaps, the long flexor.

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KYLLOSIS, CLUB-FOOT, TALIPES.

Causes of, Treatment.

"*The seat of talipes* has always, till recently, been supposed to be at the ankle joint. If the ideas expressed in our former lecture, when describing the ankle joint, concerning the motion possible at the astragalo-tibial articulation, are correct, then the only forms of talipes that could concern the ankle joint are those where the heel is raised or dropped—equinus and calcaneus. Examination of so-called equinus will satisfy any one that in them (with the exception of a few acquired cases having their origin in a traumatic contraction of the soleus and gastrocnemius) the heel is little, if at all, removed from, and can easily be restored to, its normal relation to the axis of the limb, there being really a dropping of the anterior portion of the foot; and that, as in varus and valgus, the deformity takes place at the medio-tarsal junction. The deformity of calcaneus, which is dependent upon paralysis of the above-named muscles, does occur at the ankle joint, and this I believe is the only variety of which this is true. A further anatomical reason for the truth of this statement regarding the seat of deformity is this: Of the twelve muscles of the leg which move the foot, nine, namely, the tibialis anticus, extensor proprius pollicis, extensor longus digitorum, peroneus tertius, flexor longus pollicis, flexor longus digitorum, tibialis posticus, peroneus longus and peroneus brevis, have their insertion anterior to the medio-tarsal junction, and but three—the gastrocnemius, soleus and plantaris—posterior to this articulation, these three muscles having a common insertion, by means of the tendo achillis into the os calcis. It follows, as a matter of course, that any deformity dependent upon an abnormal condition of these three muscles must have its seat at the articulation moved by them, namely the ankle and the calcaneo-astragaloid-articulation; and that, if any of the other nine muscles be affected, the resulting distortion will be anterior to the medio-tarsal junction.

"*The resultant complications of talipes are:* the effects of inflammation or irritation, defective nutrition of the foot and leg and the effects of pressure in changing the bony structure.

"*Inflammatory action* is sometimes set up in the muscles as the result of direct injury; this is very frequently the case with the fasciæ and integuments in the sole of the foot. The result in either case is a permanent shortening of these tissues, which become then one of the first obstacles to be overcome in the treatment. But *contracture* is produced in another way. The muscles that have remained sound, if unirritated, contract only with a normal degree of force; but a constant source of irritation is found in the malposition of the foot. Pressure being made in abnormal directions and upon surfaces not prepared for its reception, especially if inflammation has heightened the sensibility, causes frequent reflex contractions of the muscles. *Contracture* is the physiological result of this *prolonged contraction*.

"The effect of talipes, in *preventing proper nutrition*, is seen in the atrophy of the leg, or entire limb, the smaller size of the foot as compared with its fellow, as well as its lowered temperature and livid color. The atrophy of the leg is due to the paralysis of one set of muscles, and the gradual wasting of the sound ones, from want of exercise necessary to keep them in proper condition. The same want of exercise will partly account for the arrest of growth in the foot, but mainly it depends upon the diminution of the supply of arterial blood sent to the part and the obstruction of the return of the venous blood, caused by the malposition of the vessels of the foot. * * *

"When the disease is allowed to continue till adult life, an actual *deformity of the bones of the tarsus* occurs. Not only is the normal relative position of the bones changed, but the long-continued pressure in the new position brings about eventually a change in their articular facets. The weight of the body upon these deformed feet aggravates the deformity till the foot becomes a misshapen mass, covered with callosities, and is sometimes quite inadequate to sustain the body without artificial assistance. Locomotion becomes laborious, painful, or even impossible.

"*Treatment.*—From the characteristics of talipes above given—namely, the malposition and defective nutrition of the foot—it follows that the prime indications for treatment will be: 1. To restore the foot to its natural position; 2. To assist the nutrition by all means within our reach, such as heat, friction, motion, galvanism, injection of strychnine, &c. Treatment of *congenital* club-foot should *begin at birth*. In cases of *acquired* talipes, treatment should be commenced *immediately upon the receipt of the injury*. Every day, week or month that treatment is neglected diminishes the chances of its success when finally resorted to. * * * In a large majority of cases, if proper attention is paid to the correction of the deformity, from the birth of the child onward, the foot can be made to maintain the normal position without the aid of tenotomy. The importance of this rule and its observance can be seen at once, if for a moment we refer to the most serious obstacles which stand in the way of successful treatment of talipes. The most serious difficulties are those which arise from the following conditions: 1. Advanced stage of fatty degeneration in paralyzed muscles, due to prolonged neglect of the performance of their normal function; and, 2. Effects of inflammation produced in the muscles and fasciæ by the irritation from walking with the feet in the abnormal position. Both of these difficulties could be avoided, or greatly diminished, by early attention to the case. This principle of early treatment appears to have been recognized by Hippocrates, who applied proper bandages immediately after birth, in cases of congenital talipes. Why this sound practice should ever have fallen into disuse it is impossible to say, but certain it is that it was neglected to such an extent that, in the surgical text-books of fifty years ago, the subject is hardly referred to; and, in practice, so little was done for the cure of club-foot that, within a quarter of a century, it

ORTHOPÆDIE.

KYLLOSIS, CLUB-FOOT, TALIPES.

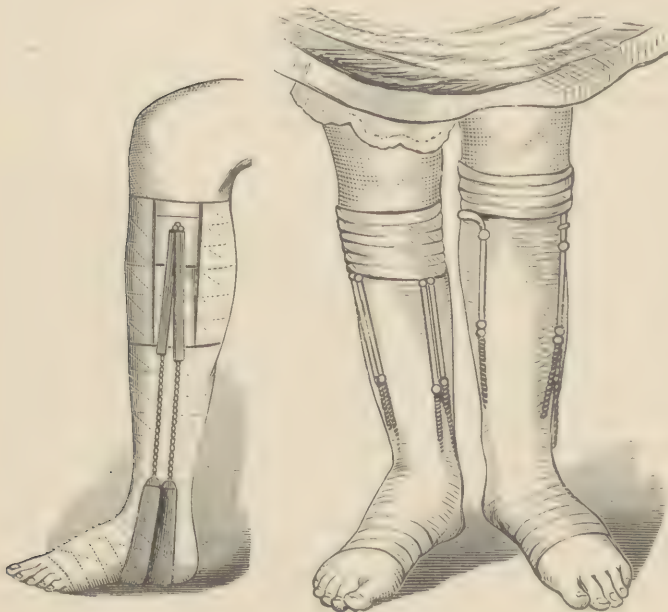
Treatment.

was extremely common to meet persons who had all their lives endured this deformity, without ever having undergone any treatment for its relief.

"How can the deformity be cured without the aid of tenotomy? The best means of cure would be constant manipulation, and the retention of the foot in a proper position by the hand of an attendant. This, however, is unfortunately an impossible plan of treatment, although I have known cases in which a faithful nurse has very considerably diminished the deformity by constant handling. As no instrument can ever have the delicate adjustment, the nice application of power, which the human hand possesses, the degree to which any apparatus approximates the hand in these respects, is the measure of its excellence. Much can be done by the hand before the dressing, or instrument which may be selected, is applied, or during the intervals when it is removed for readjustment. The manipulation should be made in the following manner: Take the foot in the hands and rub it gently with a shampooing motion. Hold it firmly in the hands, and gradually press it as nearly as possible into its normal position. While this is being done, the foot becomes quite white. When the limit of the patient's endurance is reached, the foot should be allowed to fall back as it was before and to rest for a few minutes. The operation should then be repeated, and, after several repetitions, it will be found that, with very little discomfort to the patient, the foot can be brought nearly, or quite, to its normal position. The manipulations should not be continued so long, or used with so much force, as to excite inflammation or reflex contraction. Again, the foot should never be retained, by any dressing, any nearer to a normal position than can be done without endangering free circulation. At the second dressing the foot can be restored still nearer to its normal position, and so on, step by step, until complete restoration has been obtained. If the foot is restored at once to its normal position and held there by some apparatus, regardless of a free circulation (indicated by the color of the toes), sloughing will probably supervene and treatment will be delayed for a considerable time. The shampooing friction of the muscles should be very thoroughly applied, and, in addition, they should be lightly whipped with the fingers transversely to their fibres. If a muscle be struck so that the blows fall in the direction of the fibres, the contraction produced is far less than if the blow be received transversely; the object being to awaken the paralyzed muscles to action, the latter method is far preferable. These manipulations, by drawing a large supply of blood to the part, very much increase its nutrition. They should be repeated daily if possible, and I consider them of so much importance that I greatly prefer those forms of dressings which do not interfere with this and other kinds of accessory treatment."

—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M. D.

FIG. 424I.—Barwell's Attachments of Artificial Muscles for Adjusting Club-Foot.



The ordinary cause of deformity of the foot is not contraction of certain tendons, but paralysis of the muscles connected with the uncontracted ones. Hence division of tendons which retain their normal power is not the way to cure the deformity. The author's mode of treatment is to supply the place of the paralyzed muscles by means of elastic cords. By a light and simple contrivance, these cords are fastened to points as near the origin and insertion of the paralyzed muscles as possible, and the patient is encouraged to use his limb, while at the same time constitutional remedies are prescribed, and local means, such as friction, galvanism, &c., are employed. This treatment proceeds on the principle that our aim ought to be to strengthen weak parts and not to weaken strong ones. The author has adapted his method to the treatment of knock knees and crooked shins, and he has devised means by which spring force may be brought to bear upon these deformities in such a way as to draw the bones into a more natural position. (Mr. R. Barwell.)

ORTHOPÆDIC.

KYLLOSIS, CLUB-FOOT, TALIPES.

Methods of Dressing.

"The simplest dressing is the ordinary *roller bandage*. If the patient be taken while the case is yet recent, by bringing the foot as near its proper position as possible and carefully bandaging it to retain it there, by constant observation and readjustment a cure may sometimes be effected. There are very considerable objections to this plan of treatment, viz.: it is applicable to a very limited number of cases; it is very liable to get out of order, and therefore demands constant care; it has, moreover, an objection in common with all which permanently cover the limbs by bandages or splints, that it interferes with the necessary application of friction.

"The *gypsum bandage* possesses the advantage over the last plan that it does not change its form; the limb is as securely locked as in a vice. In the details of its application quite a considerable variety exists—some preferring to first bandage the limb and then to cover the bandage with the gypsum mixed with water; others, to fill the meshes of a loosely-woven cotton roller bandage with the dry powder, and to moisten it after it has been applied; and others, again, to make from woolen or cotton cloth a covering to fit the leg, and to apply to this the plaster. These varieties are, however, immaterial; the property which gypsum has of 'setting' when wetted is the essential one to bring into operation. The objections to this plan are, the weight of the dressing, the impossibility of inspecting the limb and of applying to it friction, electricity, &c.

"Again, *splints of sole leather and gutta-percha* have been recommended as a plan of treatment. Another article which I have employed with great satisfaction is Ahl's felt-splint (see Fig. 3895).

"Before applying any of the bandages or dressings above described, the limb should be enveloped in cotton, or, what is better, wool; this prevents the permanent dressing from excoriating or unduly constricting the limb at any point. Great care should be taken that no foreign matter be entangled in the fibres of the cotton or bandages, as very severe excoriations and ulcerations may be produced by them. * * *

"Cases do occur in which the muscular rigidity is too great to yield to manipulation, unless continued for a longer time than can be generally given. A constant tractile force then becomes necessary, and the plan suggested by Dr. Richard Barwell, of London, is by far the best.

"This consists in cutting from stout adhesive plaster spread on canton flannel, or the 'moleskin-plaster,' a fan-shaped piece. In this are cut several slips, converging toward the apex of the piece, for its better adaptation to the part (Fig. 4242-46). The apex of the triangle is passed through a wire loop with a ring in the top (*a, b*), brought back upon itself, and secured by sewing. The plaster is firmly secured to the foot in such a manner that the wire eye shall be at a point where we wish to imitate the *insertion* of the muscle, and that it shall draw evenly on all parts of the foot when the traction is applied. Secure this by other adhesive straps and a smoothly adjusted roller.

"The artificial *origin* of the muscle is made as follows: Cut a strip of tin or zinc plate, in length about two-thirds that of the tibia, and in width one-quarter of the circumference of the limb. This is shaped to fit the limb as well as can be done conveniently. About an inch from the upper end fasten an eye of wire. Care should be taken not to have this too large, as it would confine the rubber to a fixed point. The tin is secured upon the limb in the following manner: From a stout (moleskin) plaster cut two strips long enough to encircle the limb, and in the middle of each make two slits just long enough to admit the tin, which will prevent any lateral motion; then cut a strip of plaster, rather more than twice as long as the tin, and a little wider; apply this smoothly to the side of the leg on which the traction is to be made, beginning as high up as the tuberosity of the tibia. Lay upon it the tin, placing the upper end level with that of the plaster. Secure this (Fig. 4243) by passing the two strips above mentioned around the limb; then turn the vertical strip of plaster upward upon the tin. A slit should be made in the plaster where it passes over the eye, in order that the latter may protrude. The roller should then be continued smoothly up the limb to the top of the tin. The plaster is again reversed and brought down over the bandage, another slit being made for the eye, and the whole secured by a few turns of the roller.

"A large majority of congenital deformities, if taken *immediately* after birth, can be restored to, and retained in, their normal position by adhesive plaster.

FIG. 4242.—Sayre's Method of Attaching Barwell's Artificial Muscles for Adjusting Club-Feet.

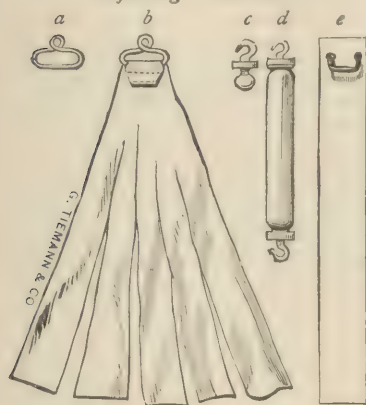
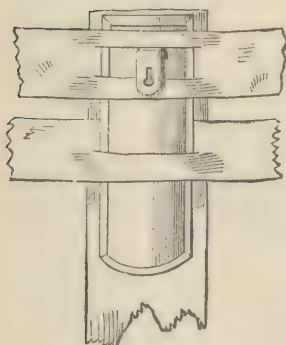


FIG. 4243.



ORTHOPÆDIC.

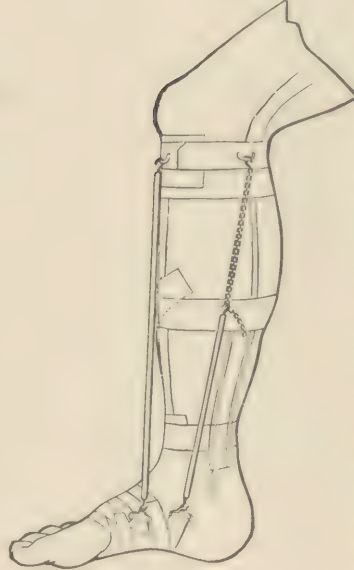
KYLLOSIS, CLUB-FOOT, TALIPES.

Methods of Dressing.

FIG. 4244.



FIG. 4245.



"A small chain, a few inches in length, containing a dozen or twenty links for graduating the adjustment, is then secured to the eye in the tin. Into either end of a piece of india rubber tubing, about one-quarter of an inch in diameter and two to six inches in length, hooks of a pattern shown in Fig. 4242, *c, d*, are fastened by a wire or other strong ligature. A hook is fastened to the wire loop on the plaster on the foot, and the other to the chain above mentioned, the various links making the necessary changes in the adjustment.

"The advantage of this plan of treatment is that it causes movements in imitation of the natural movements of the parts; permitting and promoting the constant movements of the muscles and joints, thereby increasing the circulation in the same and necessarily improving their development and power.

"The exact amount of force applied can be regulated at will by means of the chain attached to the tubing. The change of the hook from one link to another increases or decreases the power, according as the length of the chain and tubing is diminished or increased. The only objection that can be urged against this plan of treatment is that the adhesive plaster will sometimes slide and change its position; will soon become worn out and require frequent adjustments; and, what is most annoying, will often—particularly in young children and in hot weather—so irritate and excoriate the skin as to compel, for a while, the abandonment of its application.

"To permanently overcome or remedy this defect, I constructed a club-foot shoe (Fig. 4246), on the plan of 'Scarpa's shoe,' with a lateral hinge in the sole, for cases of valgus and varus; the only difference being that the motive power was the rubber tubing in place of the ordinary different kinds of springs which had formerly been used for this purpose."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M. D.

FIG. 4246.

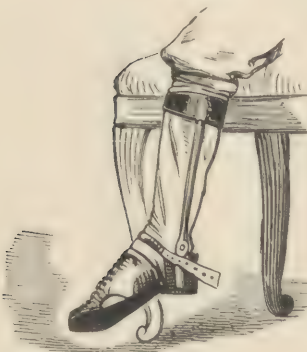
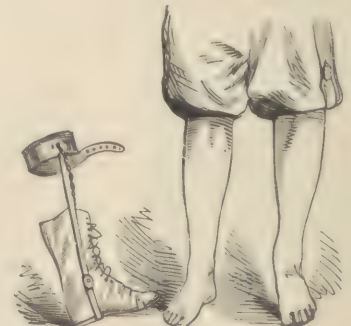
Sayre's Talipes Shoes.
FIG. 4247.

FIG. 4248.



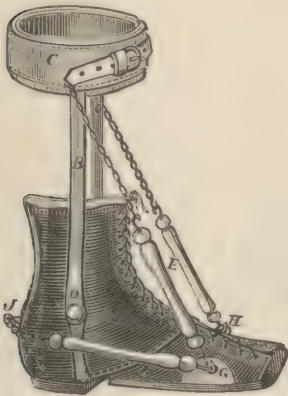
"These deformities are rarely accidental. They are almost always congenital and may be rectified at an early period by proper mechanical means to strengthen the foot gradually and restore it to its proper shape and direction; and, if these means fail, the tendons and muscles concerned in the deformity may be divided."—DUNGLISON.

ORTHOPÆDIC.

KYLLOSIS, CLUB-FOOT, TALIPES.

Talipes. Shoes, Apparatus.

FIG. 4249.
Sayre's Talipes Shoe.



"In January, of 1868, I improved my shoe by putting in the sole, opposite the medio-tarsal articulation, a *ball and socket*, or universal joint, instead of the hinge joint, which permitted only lateral movements. This sole and part embracing the heel consists of strong sheet-steel, covered with leather on both sides. Two lateral upright bars, *B*, jointed at the ankle, are fastened near the heel and to the collar-band; *G*, *H* and *I* are points for the attachments of artificial muscles, made of rubber tubing, with hooks and chains at their ends. To the inside walls of the shoe, near *A*, two flaps of chamois-leather are attached to lace together, which, passing over the front of the ankle joint, keep the heel firmly in the back part of the shoe. The accompanying figure shows the result of the last effort to make this shoe resemble an ordinary one as much as possible. In addition, the shoe has been made more comfortable and convenient by a slight heel, and by making the anterior part of the sole like that of an ordinary shoe, and not so clumsy as that of most club-foot shoes. The upper leather laces neatly over the foot, adapting itself more perfectly than if arranged with straps and buckles. The shoe is arranged for valgus or varus. There is really no essential difference; only observe the principle to apply the artificial muscles in such position as shall best supply the place of those paralyzed."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M. D.

MEASUREMENTS REQUIRED.

- | | |
|---|---|
| 1. Trace the outlines of the affected foot on a piece of paper. | |
| 2. Length of foot, Inches. | 5. Circumference of instep, Inches. |
| 3. Length from sole to calf, " | 6. Circumference above ankle, " |
| 4. Circumference of calf, " | 7. Circumference of ball of foot, " |

"Different kinds of apparatus are in vogue for the cure of club-foot, and it is, therefore, not always easy for the practitioner to determine which is the best, or which should be employed to the exclusion of others. Every orthopædic surgeon, almost, has some peculiar notions upon the subject, which induce him to adopt such measures as whim, fancy or experience may dictate. This very circumstance, however, goes to show that the same end may be attained by different means. Whatever plan be adopted, the great caution to be observed, on the part of the surgeon, is that the extension be made in a slow and gradual manner, that the skin be protected from friction and unequal pressure, that the dressing be worn day and night, and, finally, that the limb be frequently washed and immediately afterwards rubbed with some sorbefacient lotion. During the first few days, the apparatus should be applied rather loosely, until the limb has become accustomed to its presence, when it must be gradually tightened. If the skin becomes chafed, hot and tender, measures must immediately be adopted to moderate or shift the pressure, or the apparatus must be left off altogether for a few days."—"System of Surgery." Gross.

FIG. 4250.
Wyeth's
Talipes Shoes.



"When the patient is able to walk, the club-foot shoe (Sayre's, Fig. 4249) will give the greatest satisfaction. The rubber muscles should be applied and regulated in such a way that they will imitate, as nearly as possible, the normal action of the muscles they are intended to assist. A less expensive instrument, one which yields good results in the milder forms of talipes equino-varus, is shown in Fig. 4250. It consists of a sole-piece of sheet iron, which is rivetted to a heel-piece of the same material, and is roomy enough to hold the heel of the patient without chafing. It should be nicely padded, to prevent the danger of excoriations. To this heel-piece is attached, by a hinge-joint with limited forward and backward motion, an iron bar which extends to the padded iron collar around the leg, near the knee. The foot of the patient is secured to the sole-piece by adhesive plaster, with the aid of the instep-strap, and a flannel roller (these are not shown in the cut) is carried over all. As the perpendicular bar is now carried parallel with the leg, and held in this position by buckling the collar around the leg, the foot is turned outward and held in its normal position. An ordinary lacing shoe should be worn over the brace."—"Text Book on Surgery." Wyeth.

MEASUREMENTS REQUIRED.

- | | |
|---|--|
| 1. Trace outline of affected foot on paper. | 3. Length from sole to calf, Inches. |
| 1. Length of foot, Inches. | 4. Circumference of calf, " |

ORTHOPÆDIC.

KYLLOSIS, CLUB-FOOT, TALIPES.

Talipes Varus et Valgus. Apparatus.

Reeve's Universal Talipes Shoe.

FIG. 4251.—Outer View.

FIG. 4252.—Inner View.



FIG. 4253.

Reeve's Scarpa Shoe, for Severe Cases.

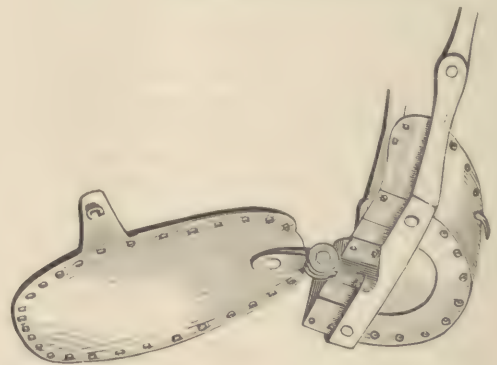


"When the deformity has been sufficiently corrected by tenotomy, splints and proper manipulations, a *suitable talipes shoe* must be worn for some time. The form which I have found extremely serviceable in private practice is shown in the above drawing (Fig. 4251). In severe cases an outside toe-spring is attached, so that the anterior part of the foot can be still further everted. A ball and socket joint, or rack arrangement worked by a key, is adapted above the ankle on the outer side. Seeing that it answers for all forms of ordinary talipes, I called it the 'universal talipes shoe.'"—*Practical Orthopædics.* Reeves.

FIG. 4254.—Barwell's Talipes Shoes.



FIG. 4255.—Sole of Barwell's Shoe.



"I found that the ball of the joint in the Sayre shoe, being somewhat bulky, was apt to wear out on the lower part, and the entire separation of the heel from the front of the foot permits water to enter and keep the stocking wet. To obviate the former inconvenience, I proposed to resolve the compound movement of ball and socket joint into its three elements, and have carried out that idea in the manner represented in Fig. 4254-55.

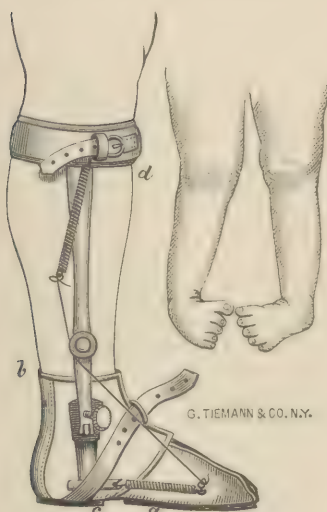
"The shoe thus modified—and I must beg my friend Dr. Sayre to pardon my making any change in his admirable inventions—answers every purpose extremely well, especially while a tolerably marked deformity, though not a severe one, still exists. It is especially adapted to the middle phase of club-foot."—"Infantile Paralysis and its Resulting Deformities," in the *London Lancet*, February, 1874. Richard Barwell, M. D.

ORTHOPÆDIE.

KYLLOSIS, CLUB-FOOT, TALIPES.

Talipes Varus et Valgus. Apparatus.

FIG. 4256.
Tiemann & Co.'s Talipes Shoe.



"The sole of this strong leather shoe is of metal, with a joint near the heel, allowing lateral motion. A durable spiral spring, *a*, draws the foot outward by a constant, elastic and easy traction. This pressure is increased or decreased at will by fastening the spring in a series of sockets, *c*.

"The single outside upright steel bar, with joints at the ankle, is fastened around the limb below the knee joint, and so constructed that the screw at the ankle joint forces the foot flat upon the floor; the foot in almost all cases being turned under as indicated by the sketch. The spiral spring, *a*, attached to a catgut cord and fastened near the toes upon the outside of the foot, elevates the toes and stretches the tendo Achilles, thus drawing the foot to its natural position.

"The shoe is well padded, and as there is no metal in the heel-cap, no excoriation is occasioned. The contraction of the leather above the heel prevents the shoe, always so difficult to retain in fleshy infants, from slipping off. The straps around the instep depress any undue prominence of the arch of the foot, and within the shoe a broad and well-padded tongue keeps the toes flat upon the sole of the shoe. This apparatus resembles much the regular shoe, and shows no deformed appearance.

"A very simple and light night shoe, to keep the foot in the same position gained by the above shoe during the daytime, is of much service.

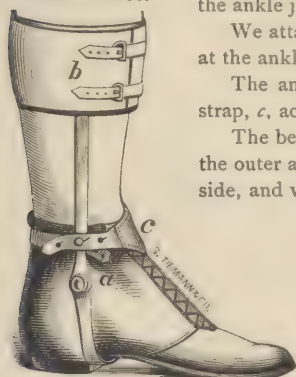
"For talipes valgus the same principle, but with reversed action, is applied."—*Medical Record*, August 16, 1869.

In ordering the above shoes please send the following

DIRECTIONS FOR MEASUREMENTS.

- | | |
|--|---|
| 1. Tiemann & Co.'s shoes. | 6. Circumference above ankle, <i>b</i> , . . . Inches. |
| 2. Length of sole of foot, Inches. | 7. Length from sole to upper part of calf, <i>d</i> , " |
| 3. Circumference of calf, <i>d</i> , " | 8. Right or left foot, or both? |
| 4. Circumference of instep, <i>c</i> , " | 9. Talipes, varus or valgus? |
| 5. Circumference of ball of foot, <i>a</i> , " | |

FIG. 4257.
Tiemann's Weak Ankle Brace.



These braces are used to maintain the position of the foot after the relief of valgus or varus by the regular club-foot shoe, and also for correcting simple lateral inversion or eversion of the ankle joint, resembling varus or valgus, commonly called weak ankle.

We attach, by means of three rivets, to the sole of a common laced shoe, a lateral stem, jointed at the ankle, *a*, passing as high as the centre of the calf, and here fixed to a band, *b*.

The ankle is supported and kept in its corrected posture by a triangular V shaped leather strap, *c*, acting against and buttoned to the steel stem on the opposite side.

The best direction for selecting the side on which the instrument should be applied is that, if the outer ankle has a tendency to eversion, the apparatus should invariably be placed to the inner side, and vice versa.

In obstinate cases it is made with double stems, in order to give greater security and keep the sole in a strictly horizontal plane; the ankle may be further protected by a small round soft pad, to prevent chafing against the steel.

MEASUREMENTS REQUIRED.

- | | |
|---|--|
| 1. Tiemann's brace for weak ankle. | |
| 2. Resembling—varus or valgus? | |
| 3. Send us a well-fitting shoe or shoes to lace. | 6. Circumference at garter (below knee), Inches. |
| 4. Length from sole to ankle joint, . . . Inches. | 7. Circumference above ankle joint, . . . " |
| 5. Length from sole to garter (below knee), " | 8. Mention if for right, left or both ankles. |

If you wish us to furnish shoes, send additional measurements as directed on page 741.

ORTHOPÆDIC.

KYLLOSIS, CLUB-FOOT, TALIPES.

Talipes Varus et Valgus. Apparatus.

FIG. 4258.—Stillman's Ankle Brace, with Clamps.



"This apparatus is for weak ankles when associated with inverted feet, for the less severe forms of talipes varus, especially when due to infantile paralysis, and for the after-treatment of such cases as have been subjected to operation. It consists of a single bar placed on the outer side of the leg, jointed at the ankle, riveted to the shoe under the heel and buckled to the leg by two girths, one just below the knee and the other above the ankle.

"It is fitted with two ratchets and an elastic webbing. One ratchet is placed just below the ankle for rotation, and allows that part of the brace below it to be thrown out and fixed at any angle with the part above; for, when so fixed, and the brace secured to the foot and leg, any inversion tendency is combated by the entire brace, which thus acts as a powerful spring to keep the foot rotated outwardly. The second or pronation ratchet is placed where the side-strip passes under the shoe, and enables the surgeon to entirely prevent any tendency of the foot to turn under; for, if the side-strip be clamped by it at an angle of about forty-five degrees outward from the foot, and then brought up against the leg and secured by the girths, the foot will be turned in its long axis so that the patient will walk on the inner instead of the outer side. This effect may be varied by the ratchet in the side-strip, so that the brace may be anything from a simple vertical support to an agent for the production of valgus, so completely does this ratchet place the limb under the control of the surgeon. Contraction of the posterior muscles is combated by the use of elastic webbing, provided with hooks passing from an eyelet in the sole opposite the base of the little toe to a point on the side-strip at about the lower girth.

"In many cases it may seem preferable to allow a limited range of lateral movement of the foot, instead of having the eversion fixed by the clamp.

This may be secured by having a loose rotary joint, and attaching a coiled spring to the side-strip, whose power can be regulated by a cog and catch, so that it may be 'wound up' to any desired degree of rotary power, thus combating the inversion by a constant elastic force without impairing support.

"The physiological point to which I wish to draw attention is the necessity of rotating the foot outward (extreme eversion) before applying elastic force, if complete reduction of an equino-varus or an equinus be desired. Whenever, in these conditions, the os calcis is drawn upward and the astragalus projects, it is impossible to apply the upward elastic force advantageously in the median line until the foot is rotated outward, as the partial dislocation of itself prevents the normal degree of movement upward in the ankle-joint. The foot should be taken in the hands of the surgeon and forcibly everted, and, after passing the median line, pronated; and it will then be found that the deformity can be relieved with much greater ease. It follows, therefore, that a brace, to be effective, should contain provision for these movements and afterward afford fixation in the corrected position, while not interfering with the normal motion of the ankle."—"A Contribution to the Treatment of Clubfoot," in *N. Y. Med. Journal*, Oct. 20, 1883. C. F. Stillman, M.D.

Fig. 4259.—Nyrop's Talipes Valgus Shoe.



MEASUREMENTS REQUIRED.

1. Stillman's ankle brace with clamps.
2. Resembling—varus or valgus?
3. Send us a well fitting shoe to lace.
4. Length from sole to ankle joint, Inches.
5. Length from sole to garter below knee, "
6. Circumferences at garter, "
7. Circumference above ankle joint, "
8. Mention if for right, left or both ankles?

If you wish us to furnish shoes, send additional measurements as directed on page 741.

"Nyrop's boot is highly recommended by Mr. Reeves. It consists of a stiff-soled lace shoe, with a leg-collar and iron or steel bar attached to the outer side of the shoe, with a lateral hinge opposite the outer malleolus. To the inner side of the sole, near the heel, is attached a strong piece of elastic webbing, by which inversion of the foot is effected by buckling the strap to the collar near the knee."—"A Text Book on Surgery." Wyeth.

Measurements required same as for Fig. 4258.

ORTHOPÆDIC.

KYLLOSIS, CLUB-FOOT, TALIPES.

Talipes Varus et Valgus. Apparatus.

FIG. 4260.
Detmold's Scarpa Shoe.



A shoe with a steel sole, an upright spring jointed at the ankle, and a spring in the direction from heel to toes, having a slight curvature in opposition to that of the foot. This last spring is worn inside of the shoe. The upright spring, by a peculiar bend, is made to evert the foot, so as to bring the sole flat to the floor and supporting the ankle; it is secured to the leg by a padded calf-band. The well padded uppers of the shoe are fastened by straps and buckles. An instep strap secures the foot in place.

Measurements required same as for Fig. 4256.

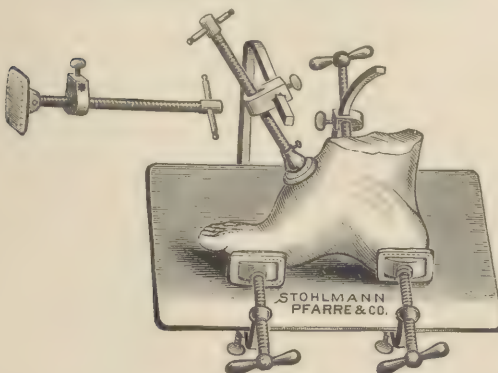
"The various theories as to the causes of congenital club-foot may be arranged under three heads: 1. *Mechanical*; 2. *Muscular*; 3. *Osseous malformation*, or arrest of development.

"Hippocrates, Paré, and Cruveilhier were supporters of the first view, and thought that abnormal pressure of the uterus on the foetus through deficient liquor amnii, or compression of the uterus by another part of the foetus, or the abnormal position and action of the umbilical cord or of the amniotic bands, would produce club-foot. But against this view the objections were that in most cases of club-foot it is impossible to find any compressing cause, either external or internal.

"The *muscular or musculo-nervous theory* was maintained by Duverney, Rudolphi, Béclard, J. Guérin, and subsequently by Delpech. This theory supposes an unequal action of the muscles and ligaments, or an insufficient development of the calf muscles, or a disease of the nerve centres. Rudolphi attributed it to intra-uterine convulsions, and Chance and Little are somewhat inclined to support this view. Guérin stoutly supported this theory, and considered club-foot as the result of convulsive muscular retraction consecutive to affection of the central nervous system, leaving, sometimes, manifest traces, and at others none whatever.

"The *theory of primitive osseous deformity* and arrest of development has had weighty names in its support. Scarpa, Broca, Robin, Lannelongue and Thorens support the view of original osseous deformity; whereas Meckel, Geoffroy, Saint-Hilaire, Breschet and Eschricht upheld the view of arrest of development, and thought that at a certain period of intra-uterine life the infant's feet were in a position of varus, and there can be but little doubt but that this is more or less the case; but it must be remembered that if this explains varus it throws no light on the other forms of club-foot."—REEVES.

FIG. 4261.—Bradford's Tarso Corrector,
for operating upon obstinate cases of club-foot.



"The object of the appliance is to exert pressure under control of the operator in three directions, and also to enable him to twist and raise the front of the foot.

"The apparatus consists: 1. Of a plate large enough for any foot; 2. Of three steel buffers or padded plates, which are attached at the ends to steel screw-rods playing through sockets with a female screw thread at the sides of the large plate. By turning the screws, which is done by the handles, the plates or buffers are pushed forward. They should be placed so as to press (1) upon the side of the first metatarsal; (2) on the side of the os calcis just beneath the inner malleolus; (3) on the outer side of the foot over the projecting head of the astragalus. The female screw through which the male screw plays is adjustable upon an arm, curved, so that pressure can be applied when it may be found necessary. The socket and arms are arranged so that they can be shifted and placed at any point along the side of the large

plate, or can be shifted from side to side, so that the appliance can be used for either foot. A straight rod, extended in the plane of the plate, gives increased power in raising the front of the foot. This is not always needed, and is not shown in the cut.

"In operating upon obstinate cases of club-foot the method of procedure is as follows: Tenotomy is performed in the usual way, the plantar fascia divided first, the tibiales tendons (if contraction is present) and the tendo-achillis last (after the deformity at the arch of the foot has been in a degree corrected); the foot is then forcibly manipulated with the hands, pressure being exercised upon the projecting head of the astragalus by the thumbs, and force applied in a counter direction by the hands grasping the ankle and forepart of the foot. It will be found, in certain cases, that com-

ORTHOPÆDIC.

KYLLOSIS, CLUB-FOOT, TALIPES.

Talipes Varus et Valgus. Apparatus.

plete correction of the deformity can not be accomplished by the hands alone, and the hindrance will be seen to be not a shortened tendon or any tissue accessible to the tenotome. The instrument just described is then to be applied, and the screws turned and adjusted so that the plates will press upon the os calcis, the head of the astragalus, and the side of the metatarsal as far as its articulation with the tarsus. The foot will now be firmly held, and by additional turns of the screw force can be applied in the desired direction. Rotation upward and outward can be effected by twisting the plate, and the equinus deformity of the foot can be corrected by pressing the end of the plate upward. In case it is desired to increase the power in this direction this can be done by increasing the length of the handle. If the screw-plates are properly adjusted, it will be found that there is no danger of a fracture, as the pressure can be so directed that the ligaments will yield before any of the bones of the tarsus can be broken. An anæsthetic is, of course, required, and correction will be done gradually rather than by any sudden tear. The extent to which force can with safety be applied is with difficulty defined; it may be said, however, that experience shows a much greater pressure can be used than would at first be thought feasible—in a majority of cases enough force can be used to convert the foot from the position of varus to that of valgus, and to correct the equinus position. In the simpler cases this is always possible; in the severer cases some minutes should be given to gradually stretch the foot. Sometimes complete correction is not possible at one sitting, and something will have to be left for after-treatment or for a second sitting.

"After the foot has been brought into a position which is nearly normal, and the contracted tissues so stretched that the foot can be held without a great amount of force, the foot should be fixed in the corrected position. For this purpose nothing has been found so useful or comfortable as a plaster of paris bandage properly applied. The foot should be held in as nearly a normal position as is possible, grasped by one hand at the toes while counter pressure is exerted on the leg. Roller plaster bandages, prepared in the way that is customary for plaster jackets, are wound around the foot and leg, which are first to be covered with one layer of sheet-wadding. The bandages are to be applied without loosening the hold upon the foot, which is to be kept in the corrected position until the bandages have become sufficiently hard as not to yield when the hold of the foot is loosened, and additional turns are then applied around the toes. The bandage should be carried above the knee and half way up the thigh, and the leg should be flexed at the knee, thus preventing any subsequent rolling of the limb within the plaster bandage. After the dressing has become stiff, and before it is absolutely hard, it can be cut through by two cuts along the dorsum of the leg and foot, and cross cuts over the foot and thigh, so that the lid of the plaster-box may be lifted and the parts inspected subsequently, when necessary, without destroying the bandage.

"There should be no wrinkles in the bandage, and no pressure should be made upon the dorsum of the foot while the gypsum dressing is hardening. After ten days to three weeks the stiff bandage may be removed, and, if the foot is sufficiently corrected, a walking shoe applied."—*Medical Record*, March 22, 1884. E. H. Bradford, M. D.

An instrument employed by Dr. C. F. Stillman to twist the anterior portion of the foot on the posterior at the medio-tarsal joint, and also to gradually and painlessly alter the angle of the foot with the leg at the ankle joint. It consists of a local extender, provided with a slotted arch for graduated movement, placed each side of the ankle joint, and another placed in front of the arch of the foot. These are attached to a flexible felt or leather sole on which the foot is firmly fastened by bandages; above they are connected to metal terminal plates, which are bound down to the leg by some immobile dressing. This splint allows the foot to be twisted into shape; it provides a local extension which relieves the parts from strain and attrition, and also allows the patient to walk without interfering with the action of the instrument—the foot being completely under the control of the surgeon.

FIG. 4262.
Stillman's Club-Foot Twister.



"Shaffer's club-foot extension apparatus (Figs. 4263, 4264 and 4265) consists of the ordinary uprights, *A, A*, fastened to the conventional heel-piece, *B*, by a plain joint on one side and an endless screw, *C*, on the other. This screw, *C*, allows us, by using the key, *D*, to place the foot-piece of the apparatus, as a whole, in any antero-posterior position we choose, and to alter it at will, either before or after application to the foot. The dotted line, *P, P*, is supposed to represent the arc of a circle, the centre of which is the screw, *C*. That part of the foot-piece, *E*, which corresponds with the tarsus and metatarsus, is joined by a common extension rod, *F* (shown in Fig. 4264), to the portion which lies under the os calcis. With the key, *G*, we are enabled to extend the anterior part of the foot-piece, *E*, at pleasure.

ORTHOPÆDIC.

KYLLOSIS, CLUB-FOOT, TALIPES.

Talipes Varus et Valgus. Apparatus.

FIG. 4263.—Shaffer's Club-foot Extension Apparatus.

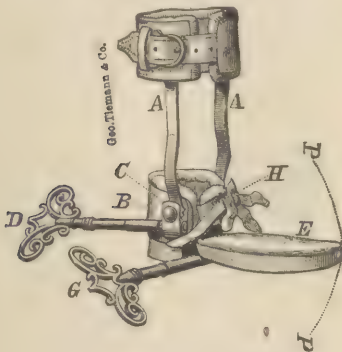
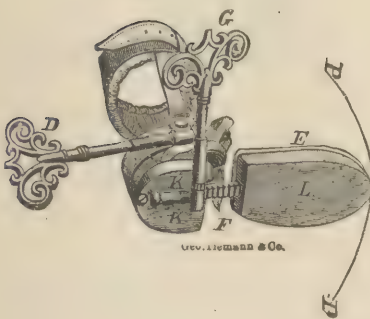


FIG. 4264.



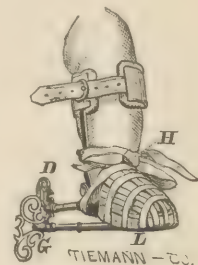
"Fig. 4264 shows the apparatus lying on its side, with a full view of the under surface of the foot-piece, *E*, and the extension rod, *F*. At *K*, *K*, is a leather or rubber heel, built up on either side of the extension cylinder, and *L* represents a wooden sole, which is elevated to a height corresponding with the rubber heel. So far as this apparatus is concerned I may say that it presents no novelty, save the extension rod, and the modifications which this addition to the apparatus makes necessary.

"To apply this instrument, we first, by means of the key, *D*, place the foot-piece in a position that will exactly correspond with the antero-posterior position of the foot—whether tenotomy has been performed or not. We then secure the heel by tying the heel-strap, *H*, as represented in Fig. 4265. We then bind the foot, anterior to the medio-tarsal joint, to the extension part of the foot-piece, *E*, by means of adhesive plaster, *vide* Fig. 4265. We first apply four or five strips to the plantar integument, which are reversed as they pass over the end of the foot-piece, and are then fastened to the under (wooden) part of the foot-plate. Five or six strips are now passed longitudinally over the toes and underneath, where they are also secured.

Transverse pieces are then passed around the tarsus and metatarsus, also underneath the foot-plate, and secured at convenient points. [The plantar strips are not shown in the engraving, and the artist has placed key *G* too far forward.] A bandage is then applied, to protect the adhesive plaster. The key, *D*, is now used to flex the foot in overcoming, to the desired extent, the tendo-achillis resistance."—*Medical Record*, November 23, 1878. Newton M. Shaffer, M.D.

Measurements required are the same as for Fig. 4256.

FIG. 4265.



"I have deemed it best, as a matter of experience, not to adopt the club-foot extension apparatus to the purely lateral deformity, as mentioned before. It is, ordinarily, and especially in infants, a very easy matter to rectify this by any lateral support of gutta-percha, tin, or other flexible material. In obstinate cases it is well to make subcutaneous sections to save time. I have found a very useful lateral splint in a modification of Taylor's ankle support, which is represented in Fig. 4266. My modification consists in the substitution of the lateral hinge, *A*, and the endless screw, *B*, for the antero-posterior joint. The dotted lines show the movement acquired by using the key, *C*. This modification enables us to apply the apparatus accurately to the extremes of varus or valgus, and to gradually, by means of the key, *C*, turn the foot to the desired extent. This splint is applied, as represented in Fig. 4267, to that side of the foot toward which the deformity looks. It should be secured by a bandage. The bandage is omitted in the engraving and two strips of adhesive plaster, *Q*, *Q*, are substituted, so that the application of the splint may be more easily shown. The counter extension surface being large and the resistance generally slight, the pressure may be very gradually applied. The foot can, under ordinary circumstances, be changed from the varus into a valgus position without any pain whatever."—"Modification of Taylor's Ankle Supports," in *Medical Record*, Nov. 23, 1878. Newton M. Shaffer, M.D.

FIG. 4266.—Taylor's Ankle Support.

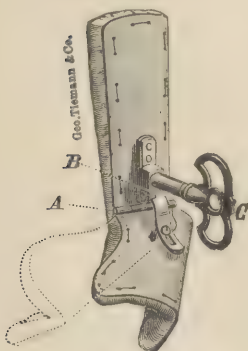
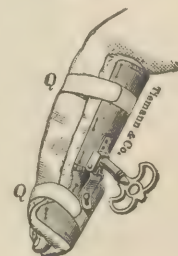


FIG. 4267. Shaffer's Modification of Taylor's Ankle Support.



ORTHOPÆDIC.

KYLLOSIS, CLUB-FOOT, TALIPES.

Talipes Equinus. Apparatus.

FIG. 4268.
Talipes Equinus.



"*Talipes equinus* is usually non-congenital. The treatment is operative and mechanical. The tendo-achilles and plantaris may alone require division, or, in addition, the plantar fascia must be cut, as when the arch of the foot is strongly contracted; the foot should usually be brought into position at once and retained by splints or the gypsum bandage. At the end of a week a shoe should be applied."—"Operative Surgery." Stephen Smith, M. D.

Simple contraction of the tendo-achillis, and consequent dropping of the toes, is conveniently corrected by means of an artificial elastic muscle, one end of which is fastened to the sole of the shoe, *a*, the other to the calf-band, *b*; it may be regulated to any degree of tension by means of a buckle, *c*. In ordering the apparatus send the following description and measurements:

1. Talipes Equinus Shoe, Fig. 4269.
2. Patient's name (or sex).
3. Patient's age.
4. Right, left, or both feet?
5. Length from sole of foot to ankle joint, . . . Inches.
6. Length from sole of foot to calf, . . . "
7. Circumference of calf, . . . "

FIG. 4269.
Talipes Equinus Shoe.

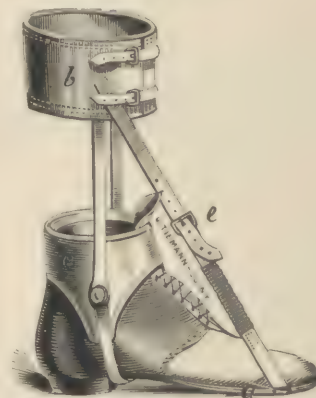


FIG. 4270.
Sayre's Talipes Equinus Shoe.



"An ordinary shoe with steel supports on either side, jointed opposite the ankle and buckled around the leg above the calf, to give attachment to a rubber elastic which runs from a stirrup over the ball of the toes, for the purpose of elevating the foot. With this shoe on and the rubber properly adjusted, the patient runs with perfect freedom and without the slightest limp."—SAYRE.

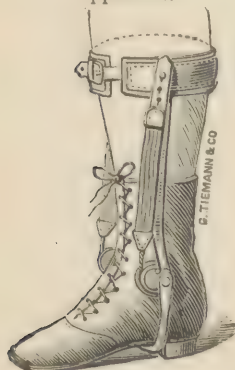
Measurements required same as for Fig. 4269.

Hudson's apparatus, like the preceding one, has on the inner and outer sides of the leg light or heavy (as the patient may require) steel bars, jointed at the ankle to a foot-piece which is securely riveted to the shoe sole. On top these two steel bars are fastened to a well padded collar, encircling the leg in the region of the garter.

The improvement by Dr. Hudson consists in attaching the artificial muscles at the joints of the apparatus, in which position they work more effectively and are not so liable to catch anywhere or trip the patient. The muscles are constructed of strong elastic webbing; secured to their lower ends are pieces of catgut, which in turn are securely fastened to the lower ends of the semi-circular grooved guides attached to the foot-piece; the catgut plays in the grooves of the semi-circular guides.

Sewed to the upper ends of these elastic webbings are strips of perforated leather, which fasten on metal buttons placed for this purpose on each side of the garter band. The tension of the artificial muscles can be regulated by buttoning the perforated straps high or low, and by their aid the foot retained in its normal position.

FIG. 4271.
Hudson's Talipes Equinus Apparatus.



MEASUREMENTS REQUIRED.

1. Send us a well-fitting shoe or shoes, to lace.
2. Length from sole to ankle joint, Inches.
3. Length from sole to garter (below the knee), "
4. Circumference at garter, "
5. Right, left or both feet?

If you wish us to furnish shoes, send additional measurements, as on page 741.

ORTHOPÆDIC.

KYLLOSIS, CLUB-FOOT, TALIPES.

Talipes Calcaneus. Apparatus.

FIG. 4272.



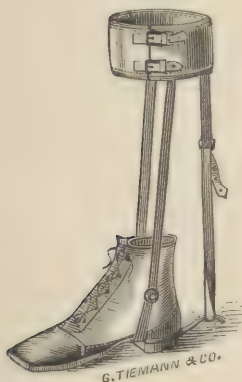
"*Talipes calcaneus* is both a congenital and non-congenital affection. In congenital cases the deformity is of the simplest kind, the position of the foot being an exaggerated degree of flexion. In ordinary cases the treatment required is passive exercise and the use of a soft padded splint applied in front of the leg and foot. In severe cases much contraction of the anterior muscles, the tendons of the *tibialis anticus*, *extensor proprius pollicis*, *extensor longus digitorum*, and *peroneus tertius* should be divided. Non-congenital calcaneus is usually the result of infantile paralysis, and, as a consequence, tenotomy is seldom required; palliative treatment alone must be attempted by the application of a proper shoe."—"Operative Surgery." Stephen Smith, M. D.

We prefer to have patients send us their own *laced* shoes for attachment to braces, but can furnish them if desired on receipt of the following:

MEASURE FOR SHOES.

- | | |
|------------------------------------|-------------------------------------|
| a. Length of sole of foot, Inches. | c. Circumference of instep, Inches. |
| b. Circumference ball of foot, " | d. Circumference above ankle, " |

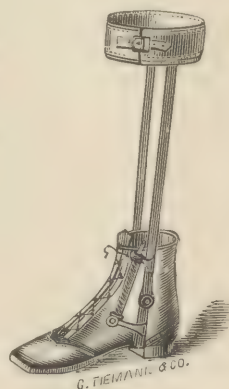
FIG. 4273.
Calcaneus Shoe.



This instrument consists of a pair of steel stems fastened to a shoe, provided with joints at the ankle and secured to the leg with a calf-band. A strong elastic cord, or webbing, is fastened posteriorly to the calf-band above, and to a spur-like piece of steel at the heel of the shoe below. By drawing this cord tight, the uplifted sole is faced downward, and the strain on the tendo-Achillis is diminished; at the same time the contracted muscles in front of the leg are extended.

Fig. 4274 shows the same apparatus, with this difference: instead of the cord, or elastic webbing, contracting posteriorly in Fig. 4273, we have a *steel spiral spring*, placed on a pivot and playing between brackets of the leg and ankle stem, to depress the front part of the foot by extension. There is not so much danger of falling with this apparatus when descending stairs, the spurs, shown in Fig. 4273, being dispensed with.

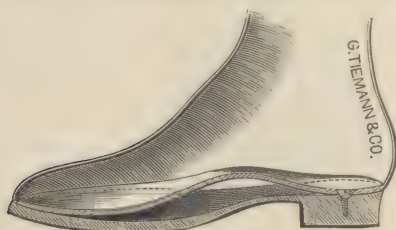
FIG. 4274.
Apparatus for
Talipes Calcaneus.



MEASUREMENTS REQUIRED.

- | | |
|------------------------|---|
| 1. Patient's name. | 5. Length from sole to ankle joint, Inches. |
| 2. Patient's weight. | 6. Length from sole to calf, . . . " |
| 3. Patient's age. | 7. Circumference of calf, . . . " |
| 4. Right or left foot? | 8. Apparatus, Fig. 4273 or 4274? |

FIG. 4275.—Eclipting Spring for Flat Feet.



Pes Planus. Flat Foot.

For flat feet we make a plain steel sole, well tempered and shaped to approach an ideal arch of a foot (see Fig. 4275). These soles are covered with buckskin and fastened inside of a common shoe with a single screw, leaving the anterior portion free to move as the weight of the body is thrown upon it. They afford a person afflicted with flat foot immediate relief. They should be thin to yield a little, but strong enough to keep the bones arched. In ordering the steel sole for flat feet, state if they are wanted for the right, left, or both feet, and send the shoes, or the outlines of the soles of the shoes, traced on paper.

ORTHOPÆDIE.

KYLLOSIS, DEFORMITIES OF THE FEET.

Pes Planus, Flat Foot.

FIG. 4276.—Sayre's Apparatus for Flat Feet.



Sayre's apparatus (Fig. 4276) consists of upright steel bars, one on either side of the leg, with joints at the ankle, and secured to the sole of the shoe. They extend nearly to the head of the tibia, and are secured by a well-padded steel band behind and buckle in front. From the top of these bars, passing over rollers, a webbing runs down inside the shoe under the arch of the foot, the *inner webbing* having a few inches of elastic insertion. This webbing can be made taut or loose at the top of the bars by a buckle, so that the arch of the foot is sustained by the extra support given it by the piece of webbing.

MEASUREMENTS REQUIRED.

1. Send us a well-fitting shoe or shoes to lace.
2. Length from sole to ankle-joint, Inches.
3. Length from sole to garter (below the knee), "
4. Circumference at garter, "
5. Mention if for the right or left foot.

Treatment by Astragaloid Osteotomy.

"Professor Stokes, in a paper on this subject, draws attention to the usually accepted theories as regards the etiology of flat foot, viz.: ligamentous relaxation and a paralytic condition of certain muscles connected with the ankle and foot. He adduces various arguments to disprove these views. Attention is called to Prof. Ogston's researches in this direction, and an account given of the operation he has devised for the cure of the deformity in question; and objections to it are taken, based on the operation being complicated and difficult, and followed necessarily by an obliteration of the medio-tarsal joint. Mr. Stokes believes that the defect causing flat foot is due, primarily, to alteration in the tarsal bones, notably the astragalus, which change in it may be either congenital or the result of disease (probably rickets), and that this stretched rather than relaxed condition of the ligaments is secondary rather than a primary change. In illustration of this view he exhibited a specimen of the deformity taken from the museum of Trinity College, and for which he was indebted to Prof. Bennett. Having regard to the fact that in the irreducible cases of flat foot osseous deformation is the chief factor, Prof. Stokes believes that the rational treatment for such cases should be to deal exclusively with the deformed astragalus, and to do so without necessarily obliterating Chopart's joint. This he did in the case of a youth aged fourteen, and with complete success. The parts to be operated upon were rendered perfectly aseptic, and an incision an inch and a half in length along the inner edge of the foot made, the centre of which incision was the prominence caused by the head of the astragalus. At the centre of the incision another was made at right angles to it, a little behind the situation of Chopart's joint, and the two triangular flaps of skin dissected back for about half an inch. A wedge-shaped piece of bone from the enlarged head and neck of the astragalus was then removed with an osteotome, and it was then found that, by adducting and supinating the foot, the arch was perfectly restored. The wound during its union was aseptically throughout, and the patient afebrile. The method Prof. Stokes adopted for keeping the foot in a position of adduction was by the application of a Dupuytren's splint, applied as in a case of Pott's fracture of the fibula. The result of the operation was most satisfactory, and casts of the foot, taken before and after the operation, were exhibited."—*The Lancet*, May 9, 1885, p. 848.

FIG. 4277.—Apparatus to Evert the Feet.



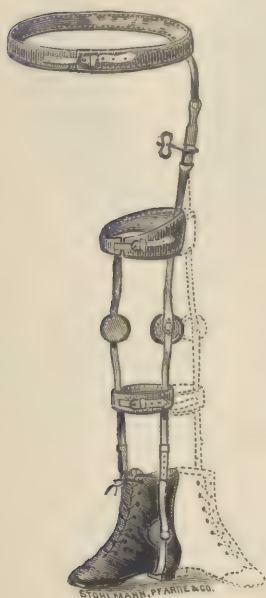
Abnormal Eversion and Inversion. Apparatus.

This apparatus (Fig. 4277) answers well for in-door exercise, but patients cannot get up or down stairs, nor walk on uneven ground without being in constant danger of falling. An apparatus carried up to a pelvic band, made in two halves, answers this purpose better. This pelvic band, being made in two sections, admits of adjusting the feet in proper position. By tightening the posterior buckle the toes are everted, while tightening of the front buckle inverts them. All our pelvic bands on the apparatus for the lower extremities are arranged in this manner and answer the purpose very well.

ORTHOPÆDIC.

KYLLOSIS, DEFORMITIES OF THE FEET.

Abnormal Eversion and Inversion. Apparatus.

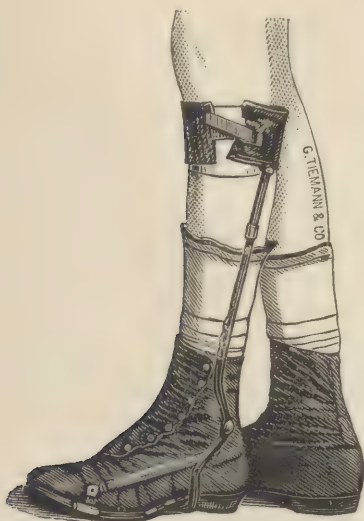
FIG. 4278.
Sayre's Rotator.

"It frequently happens, in bad cases of varus and varo-equinus, that after we have restored the foot to its normal shape, either by the constant use of elastic tension or by tenotomy of the tendo-Achilles and plantar fascia combined with elastic tension, as the case may be, that the foot, although perfect in shape, cannot be held in the proper position, but will remain inverted on account of the paralysis of the rotator muscles of the thigh; and, to correct this deformity, it becomes necessary to *evert* or *rotate outward* the *entire limb*." (See page 663, "Sayre on the Anatomy of the Ankle-Joint.")

"To accomplish this object I had constructed a shoe with the additional attachment of a rotating screw, which fulfills the indication completely. It is the application of the same principle which I have for so long a time used in the outward rotation of the femur in the third stage of hip-disease. In applying this force for the outward rotation of the foot, in cases of club-feet, a light metallic rod or shaft is secured to the bottom of the shoe, in front of the heel, passed up on the outer side of the limb, and connected with a well padded pelvis belt, having joints, of course, opposite the ankle, knee and hip. Just below the joint, opposite the hip, the shaft is divided into two sections, and at this point is an endless screw, placed transversely to the shaft. The screw is worked by a key, and is capable of producing rotation through two-thirds of the arc of a circle. There is a well padded belt just above the ankle and another belt above the knee."—"Orthopædic Surgery and Diseases of the Joints." Lewis A. Sayre, M. D.

MEASUREMENTS REQUIRED.

- | | |
|--|-------------------------------------|
| 1. Send a well fitting strong lace shoe. | 5. Length from sole to ankle joint. |
| 2. Circumference of body between crest. | 6. Length from sole to knee joint. |
| 3. Circumference of middle of thigh. | 7. Length from sole to hip joint. |
| 4. Circumference at garter below knee. | 8. Right or left? |

FIG. 4279.
Stillman's Local Eversion Brace.

"Dr. C. F. Stillman, of New York, writes thus in the *New York Medical Record*: 'If we examine the ligamentous structure of the ankle joint we observe that externally the ligaments are placed so as to allow more mobility than internally—nature evidently relying upon the inherent contractile power of the peronei muscles to hold the foot at its normal angles with the leg, and to perform all necessary eversion. The weakness or insufficiency of these muscles is of itself a sufficient cause of the deformity we are considering, even though the supports of the joints be otherwise normal; but these may also be unduly relaxed. A tendency to turn the ankle under, to have it give way externally, to point the toes inward and downward, and an habitual stumbling, shuffling gait are the main symptoms displayed. * * *'

"I have devised an apparatus for the cure of this condition which exhibits several principles distinct from any heretofore introduced to the profession. 1. It consists of a steel strip worn outside of the leg only, so that there is nothing on the inside to interfere with the child's walking. 2. It can be worn with any shoe and is detachable at pleasure. 3. It is attached to the bottom of a shoe by a pivot, thus allowing *lateral motion in the ankle*, a feature not possessed by any other form of apparatus.

"There are two essentials to the complete and perfect action of this brace: first, the pivot should be located at or near the centre of motion of the foot; and second, if any everting cord be used, the girth about the leg should be prevented from rotating.

"The centre of motion is the point where two bisecting lines meet when drawn through the foot while rotated at different angles; and when a person stands erect, a line drawn vertically through the hip-joint should pass at or near this point; and this is the proper position in which to place the attachment between the brace and shoe." (See page 744.)—*London Medical Record*, February 15. 1882. E. Noble Smith, M. D.

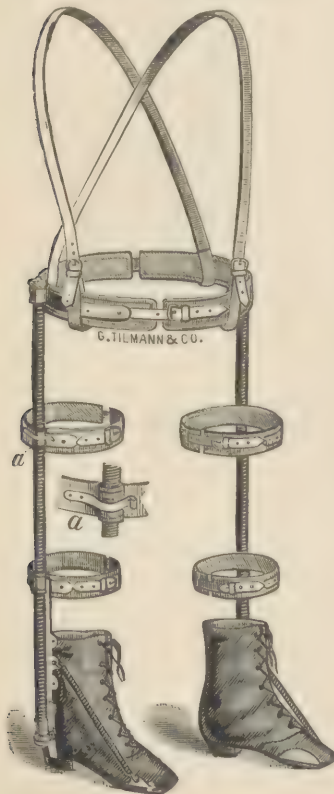
ORTHOPÆDIE.

KYLLOSIS, DEFORMITIES OF THE FEET.

Abnormal Eversion and Inversion. Apparatus.

Fig. 4280, 1, exhibits Stillman's pivotal attachment of the brace to the shoe when the evverting cord is not attached; and Fig. 4280, 2, shows the change produced by the action of the evverting cord when attached.

FIG. 4281.
Doyle's Spiral Spring Rotator.



See STILLMAN'S
LOCAL EVERSION BRACE, Fig. 4279.

"Doyle's rotator consists of a pelvic band buckled about the body and prevented from turning by shoulder-straps. From this extends a steel spiral or 'flexible shaft,' as it is called by machinists, along the outside of the leg, to be fastened into the shoe. This is three-eighths of an inch in diameter, and is held in position by straps encircling the thigh and leg. From the calf to the foot additional strength is secured by a steel upright riveted to the sole of the shoe and jointed at the ankle.

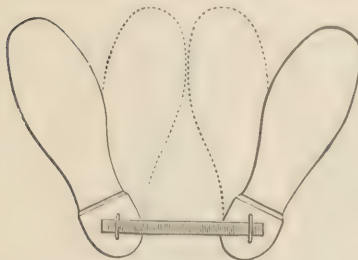
"The rotator is to be worn under the outer clothing. It is very light and causes no inconvenience to the wearer. In applying it for cases of club-foot, the pelvic belt is first to be fastened in place, and, when necessary to *evert* the foot, the shoe, to which the spiral spring is attached, is to be rotated *inwards* one, two, or as many times as the case may require. The foot is then to be placed in the shoe and secured there, and the straps are to be buckled. It will be seen at once that the spring's tendency to resume its former position will rotate the foot *outwards*.

"In cases of *everted* or splay-foot, it is evident that to *invert* the foot the shoe should be rotated outwards so that the spring, in resuming its former position, will rotate the foot *inwards*."—"Philadelphia Medical Times, December 18, 1880.

MEASUREMENTS REQUIRED.

1. Circumference of body one inch below the crest of ileum, Inches.
2. Circumference of middle thigh, "
3. Circumference of middle calf, "
4. Length from sole to knee joint, "
5. Length from sole to crest of the ileum, "
6. State whether for *right* or *left* foot, or for both.

FIG. 4282.—Doyle's Rectangle.

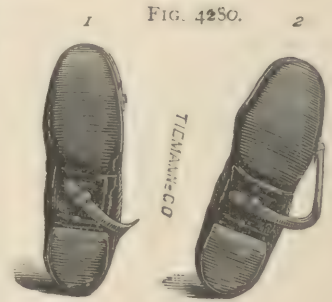


"This instrument, which I devised in 1884 for the treatment of club-foot, and have called the 'rectangle,' is constructed, as will be seen by the illustration, of single ankle braces attached to shoes that are opened down to the toes. The shoes are attached to one another by a crossbar which, by means of set-screws, can be made to hold the feet at any outward or inward angle desired. Spiral springs or elastics are attached to the outside of the soles of the shoes near the toes, and by them the feet can be held at right angles with the legs, thereby accomplishing what the mother or nurse could do by continually holding the feet in a normal position with her hands.

"This apparatus is intended to do away with the necessity of using plaster-of-paris, or of strapping, bandaging, &c. It can be taken off and applied by the mother or nurse as often as desired, thereby allowing frequent bathing,

massage, &c. It can be worn night and day, and when the child is old enough to walk the crossbars can be occasionally removed to allow of practice in locomotion.

"This apparatus is supplementary to the spiral spring rotator which I devised in 1879. The latter is more adapted for children when they are able to run about. An extended experience with the rectangle proves it to be of great service in the immediate treatment of infantile club-foot."—GREGORY DOYLE, M. D., Syracuse, N. Y.

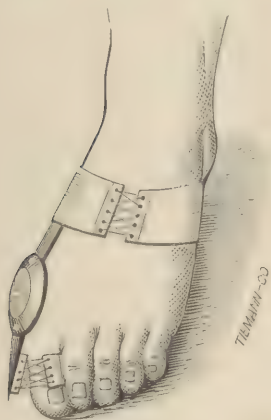


ORTHOPÆDIC.

DEFORMITIES OF THE FEET.

Bunions, Hammer-Toe. Apparatus.

FIG. 4283.
Bigg's Apparatus for Bunions.



This apparatus consists of a delicate lever of spring steel, with an oval ring in the centre, which is provided with hinges at its anterior and posterior margin. The apparatus is attached to the instep by a laced band, and the toe to the extremity of the spring by a piece of webbing. It affords the articulation freedom of motion in the natural plane, whilst the malposition of the toe is gradually rectified by constant lateral traction. It can be worn in a shoe.

DIRECTIONS FOR MEASUREMENT.

1. Place the foot on paper and trace with pencil.
2. Circumference of ball of foot, Inches.
3. Circumference of instep, "

FIG. 4284.—Apparatus for
Over-riding or Hammer-Toes. No. 1.



FIG. 4285.
Apparatus for Over-riding Toes. No. 2.



The apparatus for over-riding or "hammer toes" consists of a steel sole arranged with slits corresponding to the spaces between the toes. A strap of webbing is passed through these slits and over the contracted toe (or over each and all, as the case may require), and buckled or tied under the sole, tense enough to straighten the toe. This apparatus is kept in place by a thin silk, linen or cotton covering, laced to the instep, and may be worn in an ordinary shoe.

DIRECTIONS FOR MEASUREMENT.

1. Place the foot on paper and trace with pencil.
2. Circumference of ball of foot, Inches.
3. Circumference of instep, "

Nail and Corn Instruments.

'The nail consists of the flattened cells of the papillæ of the posterior part of the matrix, and of the mucous layer of the beds of the matrix; the former are pushed forwards along the beds in ridges, and the latter are added to the under surface of the nail (VIRCHOW).

"*Inflammation*, acute, may follow injuries, as blows, the penetration of sharp bodies; the chronic is caused by syphilis, eczema, psoriasis; the result may be irregular growth of the nail, or its destruction by suppuration and ulceration; in unhealthy children the inflammation may be followed by ulceration of the matrix. The treatment should be to relieve the inflammation by the removal of the cause, and such general and local remedies as the special conditions demand.

"In *atrophy* the functions of the matrix are diminished, and the nail may become thin, small, narrow, soft, or be wholly lost. In *hypertrophy*, the functions of the matrix are increased, and, as a consequence, the nail may be of unusual length and width, or the substance of the nail may be thickened throughout, or in the form of a cone or wedge, raised in a shapeless hump, often continued in a long, straight or curved tap-shaped excrescence.

"The treatment of these affections is the same so far as they depend upon the same conditions. All sources of local irritation should first be removed; syphilis requires the ordinary general treatment, and the local application of mercurial plaster wound around the ungual segment of the finger or toe, so that it compresses the fold of the nail. Non-syphilitic affections require the same treatment as in other parts, but special effort must be made to secure the effect of the remedies upon the matrix and bed of the nail. In hypertrophy, india rubber worn upon the part soon macerates the epidermis and diminishes hyperæmia of the papillary layer (HEBRA). The local treatment should aim to remove such excrescences as are deformities and annoyances, by means of scissors, the knife, bone-nippers, or a fine saw, care being taken not to extract the nail from its bed.

ORTHOPÆDIC.

DEFORMITIES OF THE FEET.

Nail and Corn Instruments.

"*Ingrowing* is a curving downward of the margin of the nail, and in general is found on the external border of the nail of the great toe. It is due to the pressure of tight boots and shoes, and especially when the nail is hypertrophied. The fold of the nail becomes inflamed, the skin ulcerates; red, spongy granulations appear, and the part becomes exquisitely tender; the ulcerative process may extend backward, and finally the matrix and the whole end of the toe may be involved in the inflammation. The treatment at first should consist in attempts to heal the ulcerated point where the nail penetrates the skin. When the inflammation involves the whole fold and extremity of the toe, extirpate the portion of the nail involved, as follows: with sharp-pointed scissors slit up the nail, then seize the offending portion, and with a slight twist remove it from the matrix. When the inflammation extends completely around the nail, the entire nail should be removed and the matrix excised. Drop a four per cent. solution of cocaine hydrochlorate upon the raw surface in the furrows on each side of the nail; apply a cloth soaked with the solution against the upper surface of the toe, and inject the fluid in two or three places into the matrix; after an interval of fifteen minutes the nail may be removed without pain (F. P. PORCHER).

"The *claw-like nail*, onychogryphosis, depends upon a hyperplastic state of the entire matrix of the nail. The only reliable remedy is complete removal of the nail and its matrix (T. BRYANT), with such general treatment as the case requires.

"*Horny growths* resembling exostoses sometimes appear at the margin of the great toe, and create much suffering. The only treatment is excision (T. BRYANT).

"*Psoriasis* appears as a thickened, rough, scabrous, and usually convex condition of the central portion of the nail. The appearance of the nail is improved by smoothing with glass or sand-paper, or by friction with dilute acetic acid."—"Operative Surgery." Stephen Smith, M. D.

FIG. 4286.—Corn Knife and File.



FIG. 4287.—Nail Cleaner and File.

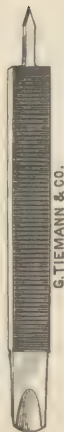


FIG. 4288.—Pocket Case Scalpel, for Corns.



FIG. 4289.—Nail Nippers.



FIG. 4290.—Splinter Forceps.



FIG. 4291.—Dissecting Scalpel, for Corns.



FIG. 4292.—Corn Knife (spring handle).



FIG. 4293.—Nail Extracting Forceps.



ORTHOPÆDIE.

DEFORMITIES OF THE FEET.

Nail and Corn Instruments.

FIG. 4294.—Van Buren's Sequestrum and Nail Extracting Forceps.

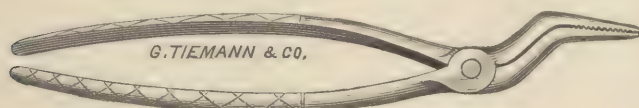
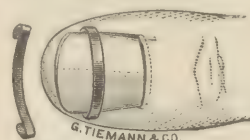


FIG. 4295.—Spring for Inverted Nails.



Goldberg's Chiropodist's Pocket Set, with Tiemann & Co.'s Patent Catch Instruments.

\$37.

- 3 Tenotomes.
- 2 Curved Bistouries (strong edge and strong point for cutting nails).
- 3 Scalpels, assorted sizes.
- 1 Finger Knife.
- 1 Metacarpal Saw.
- 1 File-cut Knife.
- 1 Sharp-pointed Bistoury.

- 1 Probe-pointed Bistoury.
- 1 Exploring Needle.
- 3 Ivory Handles to fit the above blades.
- 1 Hard Rubber and Platina Caustic Holder.
- 1 Stout Dressing Scissors, nickel-plated.
- 1 Delicate Curved Scissors, nickel-plated.
- 1 Straight Blunt Scissors, nickel-plated.
- 1 Dressing Forceps, with three points.
- 1 Splinter Forceps.
- 2 Silver Probes.
- 1 Morocco Case, with three pockets for carrying [plaster.]

PROSTHETIC.

COMPENSATIVE APPLIANCES.

Pseudarthrosis, Dangle Limbs, Artificial Limbs.

"Operative surgery may not only fail to correct deformities, but in its effort to save life may sacrifice useful parts and leave the patient with maimed or defective limbs. The application of apparatus to compensate the loss of parts may be regarded as the fulfilment of the final obligation of the surgeon to his patient. Too often this important duty is either imperfectly performed or entirely neglected. But, in the present advanced state of *mechanic art*, the surgeon is culpable who does not exhaust its resources in the effort to restore both the function and the symmetry of lost parts. It is the duty of every surgeon, therefore, to have that knowledge of compensative appliances which will enable him to prepare the maimed limb for the best possible apparatus, and to guide the patient to a judicious selection. The following principle should always govern in the selection of prosthetic apparatus, namely: in construction the mechanism should so conform to the anatomy of the lost part that all of the normal functions will be as exactly produced as possible."—"Operative Surgery." Stephen Smith, M. D.

Pseudarthrosis.

"The failure of ossific union of the ends of the bones after fracture may result in (1) union by fibrous tissue; (2) extreme mobility without union; (3) a rounded and pointed condition of the fragments which are connected by fibrous bands; (4) a dense capsule containing fluid and the ends of the bones round and smooth, false joints. The causes of non-union are numerous, and should be thoroughly studied in each case. It may be due to a want of proper apposition, or syphilis, or drunkenness, or general feebleness. In the treatment the existing cause must, if possible, first be removed. The subsequent measures usually adopted generally have the following order: 1. Friction of the fragments is produced by rubbing them together briskly, and then the parts are kept for a time in a state of rest, or the patient is allowed to move the limb lightly; 2. The drill is most useful in oblique fracture (see page 109); 3. Subcutaneous section; 4. Resection and suture of the extremities of the bones.

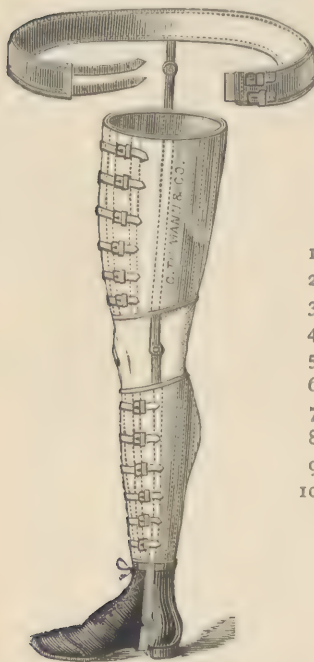
"In cases which resist operative measures, or which are not adapted for such treatment, the last resource is the application of suitable apparatus which will enable the patient to use the limb. It often happens that under such treatment the patient regains vigorous health and the bones become firmly consolidated. It is a question yet to be determined whether these appliances ought not to be far more generally employed in place of the preceding operations."—"Operative Surgery." Stephen Smith, M. D.

PROSTHETIC.

COMPENSATIVE APPLIANCES.

Pseudarthrosis.

FIG. 4296.—Apparatus for False Joints in the Leg or Thigh resulting from Resection or Fracture of the Bones (un-united).



This apparatus consists of two lateral steel stems, the inner one of these is carried to the upper third of the thigh, the outer one terminates in a pelvic band situated an inch below the iliac crests. Calf and thigh bands, made either of sole-leather nicely moulded to the limb, or of sail-cloth, stayed by a number of steel springs, corset-like, and well-padded, connect the steel stems, which latter are provided with joints for the ankle, knee and hip. The strength of these stems must be in proportion to the patient's weight. The leather or sail-cloth casing is required only at the place of the false joint, the other band may be softer and smaller, as convenient. If desired, the knee-joint may be made to remain stiff when walking, and flexible when sitting down, by merely touching a spring with the hand outside the clothing.

DIRECTIONS FOR MEASUREMENT.

1. Patient's name.
2. Patient's weight
3. Right or left leg.
4. Position of false joint.
5. Length from sole to ankle, Inches.
6. Length from sole to knee, "
7. Length from sole to crutch (perinæum), "
8. Length from sole to trochanter major, "
9. Length from sole to iliac crest, "
10. Circumference at

1st buckle, Inches.	7th buckle, "
2d buckle, "	8th buckle, "
3d buckle, "	9th buckle, "
4th buckle, "	10th buckle, "
5th buckle, "	11th buckle, "
6th buckle, "	12th buckle, "
11. Circumference of pelvis one inch below iliac crests, "

If we are to furnish shoes the following additional measurements are required:

- | | |
|---|---|
| a. Length of the sole of foot, Inches. | c. Circumference of instep, Inches. |
| b. Circumference of the ball of foot, " | d. Circumference of ankle, " |

Dr. H. M. Smith's Instruments for Treatment of Un-united Fracture by Pressure and Motion.

(FIGS. 4297, 4298, 4299, 4300.)

In the application of Smith's apparatus let it be remembered: 1st. That the pressure at the seat of the fracture must be as great as can be borne without inflaming the skin; hence the strap at this point must always be firmly drawn, so as to make the apparatus also act as a ferule around the ends of the fragments.

2d. That in the lower extremities the weight of the body is sustained by the upper part of the hollow splint, just as a stump is sustained in an artificial limb after amputation. The upper strip should, therefore, be firmly drawn when the patient is about to walk; but it should be slackened, so as to be more comfortable, when the patient is in bed or sitting up in a chair.

3d. When worn for several months the inside lining and stuffing should be renewed, so as to give accurate support.

4th. When from union occurring it is proposed to lay aside the splint, let it be taken off at night for ten days, or while sitting up in a chair, before any attempt is made to walk without it.

5th. It is useful in recent fractures, enabling the patient sooner to sit up.

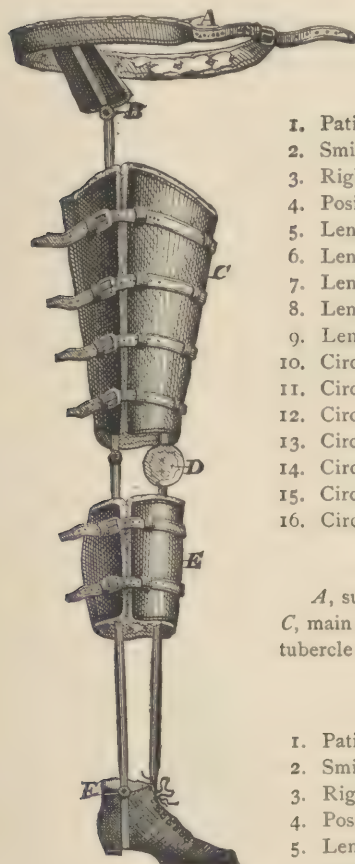
In the manufacture of these limbs the side bars, that are the main support, are of cast steel, one-half inch wide and one-eighth inch thick, which is strong enough to sustain any ordinary weight. For the back and front splints that surround the limb and act as a ferule at the seat of fracture, we take galvanized sheet iron, No. 6, stuffed with wool, covered by buckskin on the inside of the splint, and morocco on the outside. The attempts to make lighter limbs by using stiff leather and steel half rings has not proved advantageous.

PROSTHETIC.

COMPENSATIVE APPLIANCES.

Pseudarthrosis.

FIG. 4297.—Smith's Brace, for Un-united Fracture of the Femur.



A, pelvic band; *B*, hip-joint; *C*, conical thigh piece which supports the weight of the body and makes pressure on the fractured ends of the bone, permitting sufficient friction to excite periosteal action; *D*, knee-joint in side irons; *E*, support at calf; *F*, laced shoe and ankle-joint.

DIRECTIONS FOR MEASUREMENT.

1. Patient's name.
2. Smith's artificial limb for un-united fracture of the femur (Fig. 4297).
3. Right or left side.
4. Position of false joint.
5. Length from sole to ankle, Inches.
6. Length from sole to knee, "
7. Length from sole to crutch (perineum), "
8. Length from sole to trochanter-major, "
9. Length from sole to iliac crest, "
10. Circumference above iliac crest, "
11. Circumference of thigh close to groin, "
12. Circumference of middle of thigh, "
13. Circumference of middle of knee-joint, "
14. Circumference around the tubercle of tibia, "
15. Circumference of middle of calf, "
16. Circumference of ankle, "

A, support at middle of thigh; *B*, knee joint in side irons; *C*, main support of the body by accurate adjustment below the tubercle of the tibia; *D*, ankle joint and boot.

DIRECTIONS FOR MEASUREMENT.

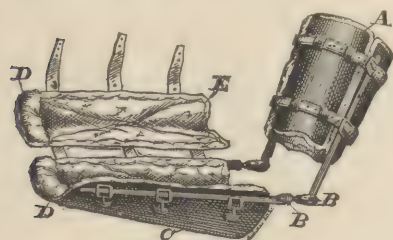
- | | |
|--|---|
| 1. Patient's name. | |
| 2. Smith's artificial limb for un-united fracture of the tibia | |
| 3. Right or left side. | (Fig. 4298). |
| 4. Position of false joint. | |
| 5. Length from sole to ankle joint, Inches. | |
| 6. Length from sole to knee joint, " | |
| 7. Length from sole to middle of thigh, " | |
| 8. Circumference around the ankle joint, Inches. | 11. Circumference around tubercle of tibia, Inches. |
| 9. Circumference below calf, " | 12. Circumference around middle of knee joint, " |
| 10. Circumference around middle of calf, " | 13. Circumference around thigh above knee, " |

If we are to furnish shoes, additional measurements are required as on page 748.

FIG. 4298.
Smith's Brace,
for Un-united Frac-
ture of the Tibia.



FIG. 4299.—Smith's Brace, for Un-united Fracture of the Forearm.



A piece accurately embracing the arm; *B*, joint for flexion and extension of forearm at elbow; *C*, pivot-joint permitting rotation of head of radius in semi-pronation and supination; *D*, ensheathing piece for forearm; *E*, a thick pad to press on styloid processes of ulna and radius at their carpal surfaces, so as to preserve the parallelism of these bones.

DIRECTIONS FOR MEASUREMENT.

1. Patient's name.
2. Smith's artificial limb for un-united fractures of the forearm.
3. Right or left side.
4. Length from middle of humerus to external condyle, Inches.

PROSTHETIC.

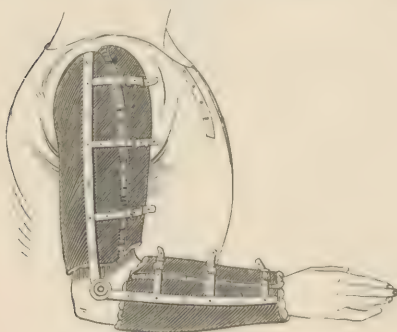
COMPENSATIVE APPLIANCES.

Pseudarthrosis.

- | | |
|---|--|
| 5. Length from condyle to styloid of radius, Inches. | 8. Circumference at elbow joint, . . . Inches. |
| 6. Length from internal condyle to styloid of ulna, " | 9. Circumference at upper end of forearm, " |
| 7. Circumference around middle of arm, . . . " | 10. Circumference at middle of forearm, " |
| | 11. Circumference at wrist, " |

FIG. 4300.—Smith's Brace, for Un-united Fracture of the Humerus.

This apparatus fits close over the rotundity of the shoulder and forearm, and is accurately jointed at the elbow.



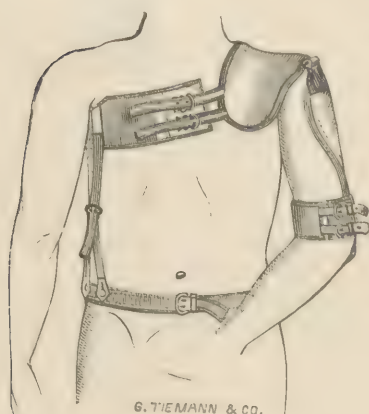
DIRECTIONS FOR MEASUREMENT.

1. Patient's name.
2. Smith's artificial limb for fracture of the humerus (Fig. 4300).
3. Right or left side.
4. Length from acromion to point of external condyle, . . Inches.
5. Length from condyle to styloid of radius, "
6. Length from internal condyle to styloid of ulna, "
7. Circumference from point of shoulder to opposite axilla, "
8. Circumference around top of shoulder over deltoid, . . . "
9. Circumference around middle of arm, "
10. Circumference at elbow joint, "
11. Circumference at upper end of forearm, "
12. Circumference at middle of forearm, "
13. Circumference at wrist, "

Be careful to take circumference at wrist while the radius and ulna are parallel, or between pronation and supination.

Dangle Limbs.

FIG. 4301.—Artificial Humerus.



The flail-like movement of the upper extremities after resection of bones and excision of joints frequently renders them entirely useless without apparatus, but with this, suitably constructed and adjusted, these limbs become very serviceable. This is accomplished by substituting an external lever, upon which the muscles can act, for the injured bone. A brass cap, well padded, is accurately fitted to the shoulder, and kept in place by axillary straps and suspenders. To this cap we attach, by means of a sort of universal joint, a concave steel bar, covered with leather, fitting the arm and buckled thereto just above the elbow joint and as high up as may be necessary. With the aid of this apparatus a person can use his arm in many directions. In order to make this apparatus fit well the patient must either visit us for adjustment, or, if this is inconvenient, the surgical attendant must send us an accurate plaster-of-paris cast of the shoulder and the following information :

DIRECTIONS FOR MEASUREMENT.

1. Patient's name (or sex).
2. Right or left arm ?
3. Length of the arm from axilla to forearm when flexed, Inches.
4. Length from shoulder to elbow, "
5. Circumference of the arm above the elbow, "
6. Circumference of chest under axillæ, "

PROSTHETIC.

COMPENSATIVE APPLIANCES.

Artificial Limbs.

"Artificial limbs are ingeniously contrived apparatus by which the loss of limbs in battle, &c., can be greatly palliated."—DUNGLISON.

FIRST ARTIFICIAL LIMBS ON RECORD.

"To Mardonius, who was very desirous to begin the battle, the sacrifices were not very propitious; but to him also, if he stood on the defensive, they were favorable: for he too adopted the Greek sacrifices, having for his diviner Hegesistratus, an Elean, and the most renowned of the Telliadæ. This man, before these events, the Spartans had taken and bound for death, because they had suffered many atrocious things from him. In this sad condition, as being in peril for his life, and having to suffer many tortures before death, he performed a deed beyond belief. For, as he was confined in stocks bound with iron, he got possession of a knife, which had by some means been carried in, and immediately cut off the broad part of his foot—the most resolute deed I ever heard of. Then, as he was guarded by sentinels, he dug a hole through the wall and escaped to Tegea, travelling by night, and by day hiding himself in the woods and tarrying there. Thus, though the Lacedæmonians searched for him with their whole population, on the third night he arrived at Tegea; but they were struck with great amazement at his daring when they saw his foot lying on the ground and were not able to find him. In time, cured of his wounds, he procured a wooden foot, and became an avowed enemy to the Lacedæmonians."—Herodotus. John L. White's (LL.D.) Edition, page 311.

"The cripple may go out on the Sabbath with his wooden leg, such is the dictum of Rabbi Meir; but Rabbi José prohibited it."—Mishna. "American Mechanical Dictionary." Knight.

Artificial Legs.

FIG. 4302.
Bucket Leg.

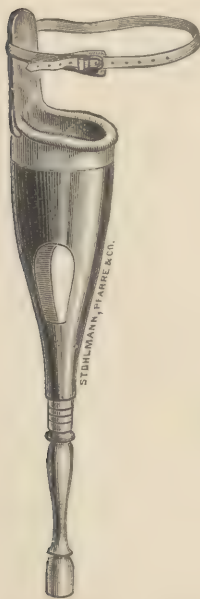


FIG. 4303.
Thomas' Artificial Legs.



The bucket leg, Fig. 4302, consists of a hollow sheath or bucket, accurately conformed to the shape of the stump, and having, in lieu of the more symmetric proportions of the artificial leg, a pin placed at its lower end to ensure connection between it and the ground. This form of leg really fulfils all the conditions (excepting external similitude) embraced by a better piece of mechanism. It is employed with benefit by those patients who, from lack of confidence, prefer learning the use of an artificial leg by first practicing with this substitute.

"As regards artificial limbs, the principle which Thomas has embodied in his knee splint, of bearing the body upon a pelvic ring encircling the upper part of the thigh, may very conveniently be applied to them."—"Clinical Notes," by Mitchel Banks, F.R.C.S., Liverpool Royal Infirmary. February, 1884.

Thomas' artificial leg (Fig. 4304) is for amputations above the knee. Fig. 4303 is for amputations below the knee.

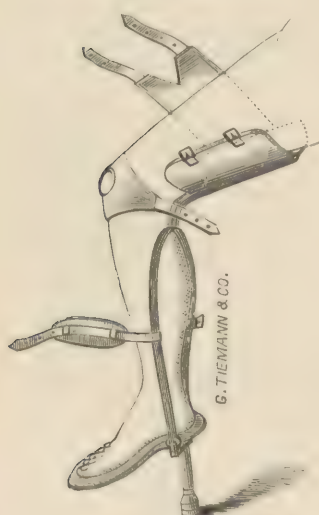
PROSTHETIC.

COMPENSATIVE APPLIANCES.

Artificial Limbs.

** For want of space we have illustrated only the most simple forms of artificial limbs. Information regarding the various patterns of arms and legs now in use will be cheerfully furnished on application.

FIG. 4305.—Bigg's Instrument for Short Leg.



This instrument is very useful where shortening of the limb is the result of ankylosis of the knee-joint. It is a modification of Bigg's, and consists of a thigh-trough, well padded, and attached to a strong steel stem, bifurcating below the knee and running down each side of the leg, terminating in a socket which is fitted up with a rubber bottom to rest on the ground. The thigh is secured into the apparatus by straps and buckles, and the weight of the body transmitted to the ground by the side stems without straining the knee. For further comfort the knee may be kept in place by a knee-cap. A strap is passed over the middle of the leg, while the foot rests on a swivelled plate placed between the bifurcated stem.

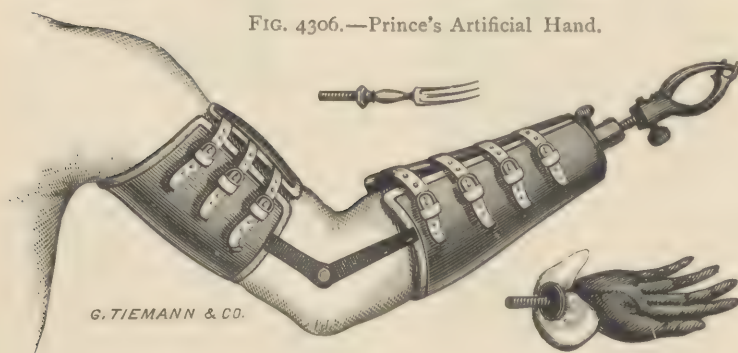
DIRECTIONS FOR MEASUREMENT.

1. Patient's name.
2. Right or left leg?
3. Length from sole of foot to knee joint, Inches.
4. Length from knee joint to upper third of thigh, "
5. Circumference of the thigh, "
6. Circumference of the calf, "
7. Degrees of the angle of flexion, "
8. Distance from the heel of the patient's shoe to the ground when standing erect, "

See other forms of shoes for short leg on page 710.

Artificial Hand.

FIG. 4306.—Prince's Artificial Hand.



"This substitute for the hand enables a person to hold a pen or pencil, and with the same instrument to grasp the handle of a hoe, hammer or shovel. A conception of the instrument will readily be obtained by a glance at the cut.

"The apparatus is fastened to the investment of the limb by means of a screw, and, by aid of the other hand, it may readily be replaced by a fork, if it is not preferred to hold the fork in the grasp of the instrument, or a gloved hand can be screwed on in place of the useful instrument.

"The fenestrum is for holding a whip or hammer, and its size is regulated by a screw, so as to fit objects of different sizes. Small objects are held in the fork at the end of the apparatus, and, by screwing down more or less the lever which constitutes one side of the fenestrum, the grasp can be accommodated to the size of a needle or pencil. The instrument is represented in the cut as not quite closed, for small objects.

"The screw, which constitutes the shank of the instrument, is so arranged that it can be made stationary, a necessary condition in holding a whip or hammer, or left to rotate, as would be necessary in holding the handle of a plough. It will be seen that the instrument has great variety of adaptation.

"There are elastic straps, attached to the investment of the arm and to a shoulder-cap, and passed around the chest to prevent the whole apparatus from sliding off in pulling or in carrying a weight. The instrument is very far from being an adequate substitute for the natural hand, but it is believed that it combines the utility of a grasp for large objects combined with the capability of holding small things better than any instrument which has yet been devised."—DAVID PRINCE, M.D.

PROSTHETIC.

COMPENSATIVE APPLIANCES.

Artificial Arm.

FIG. 4307.
Artificial Arm and Hand.

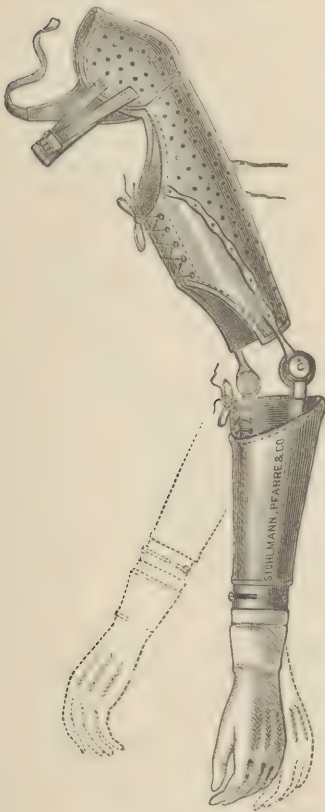


FIG. 4310.—Gun Holder.



Amongst the instruments to be adapted to an artificial arm, the knife and the fork hold the foremost place. When a stump is short a certain amount of difficulty occurs to the patient in getting the fork to the mouth, but this can easily be overcome if a particular set or shape be given to its stem (Fig. 4311).

If the right hand be lost, it is necessary to furnish some mechanical means for enabling the wearer of an artificial arm to employ his pen. For this purpose a metal holder inserted into the palm of the hand has been devised, and by its aid the patient can grasp a pen with sufficient power to write tolerably well (Fig. 4312).

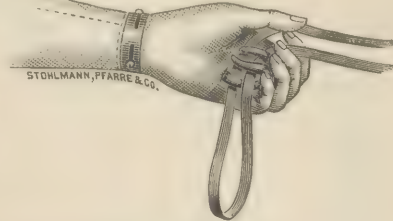
When the stump of the amputated arm is moderately long, an artificial one, as represented in the cut, is made by us. It is of graceful appearance, but is not intended for heavy work. By a simple mechanism of the hand other instruments may be adapted, as follows:

"By fixing a spring within the centre of the thumb, a sufficient amount of pressure is exercised between thumb and forefinger to admit a pen being manipulated, a neckerchief tied, &c. The flexibility of the natural hand being thus to some extent imitated, leaves nothing to be desired in the way of symmetry. Often, indeed, the artificial hand is more symmetrical in aspect than the natural, and, in a spirit of coquetry, the gloved substitute is frequently displayed in preference to the real hand. But such a hand possesses no grasping power, excepting only the feeble pressure already mentioned between the thumb and the finger. Provision has, therefore, to be made for attaching instruments to its palm, similar in character to those made in the stump-arm. The hand, indeed, acts as an elegant shield for the mechanism by which various instruments are held."—BIGG.

FIG. 4308.—Hand Hook.



FIG. 4309.—Driving Hook.



"This mechanism and some of its applications are shown above, and in the following illustrations. Fig. 4308 represents a simple hook with spring fastening, by which it can be secured to the palm of the hand and removed from it at pleasure. The office of the hook is important, enabling the artificial hand to fulfil any act of ordinary lifting, &c. There are various modifications of the hook, such as the driving hook (Fig. 4309), composed of a double tenaculum, which admits of reins being separated, and thus held in the same position as they would be by the natural fingers.

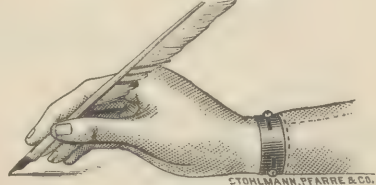
Loss of the hand by the explosion of a gun occasionally occurs, and it happens sometimes that the accident does not quench the desire of the sportsman for a renewal of his amusement. This desire, when the right hand still remains, is easily accomplished by affixing to an artificial hand a hook so shaped as to hold the barrel of the gun (Fig. 4310).

Another kind of hook is one capable of being fastened to the arm plate.

FIG. 4311.—Fork.



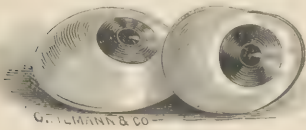
FIG. 4312.—Pen Holder.



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4313.
A New Patent Artificial Eye.



children—preventing a distortion of the face. The face of a child will be distorted, if no artificial eye is worn, by the falling in of the parts about the stump.

The above eye is made of glass and a composition, the iris only being made of glass. It has been patented, in 1881, in America, Germany and England. It is not liable to breakage, and furthermore also possesses the advantages of lightness (a glass eye is heavier, and although the difference in weight is very little, patients have informed us that they can readily *feel* the difference in weight when the eyes are inserted), and the sclerotica, of composition, may be *trimmed with a penknife* or a file to adjust it accurately and comfortably to the parts.

These eyes have been favorably known for some time in Europe. They are more natural and more beautiful than the glass eyes, and have been recommended by the majority of oculists, particularly on account of the ease with which they may be trimmed for adjustment, after the correct match in color has been found. They do not reflect the sunlight as glass eyes do, and are therefore not so easily detected and are not heating to the parts.

The patentee and manufacturer states that no hospital in London uses the glass artificial eyes at present, and even Paris, which has furnished the greater part of artificial eyes for the world heretofore, has ordered great quantities during the last year.

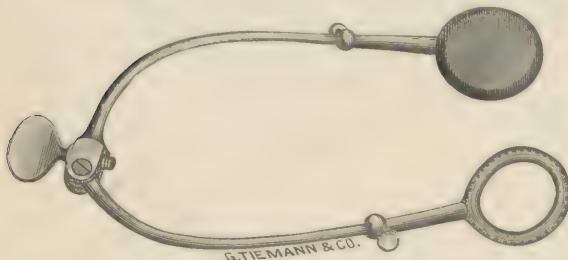
We have on hand a large assortment of all colors, forms and sizes, for the right and left eye, from which personal selections may be made, or we can send them by mail upon receipt of price. When ordering send an old artificial eye (even if broken), or, if that is *impossible*, send the following particulars:

1. Right or left eye?
2. Diameter of iris of well eye.
3. Normal diameter of the pupil.
4. Estimated diameter of well eyeball.
5. A painting (natural size) representing accurately the eye region of both eyes, the color of the iris and sclerotica.

N. B.—Eyes cannot be returned after they have been cut or trimmed. The eye must not be brought in contact with a flame.

Compression of the Carotid Arteries, for Arresting Convulsions in Epileptics.

FIG. 4314.—Carotid Artery Compressor.



“That portion of the continuity of the common carotid artery which I have found best suited to the application of instrumental compression is situated opposite a point which is located slightly above the juncture of the thyroid with the cricoid cartilage. The operator must use all diligence to avoid compressing the internal jugular, and, although much can be obtained by instruments, the final success attending their use will depend greatly on the dexterity of the practitioner himself.

“The chief features of this instrument are two curved metallic armatures, to each of whose extremities is attached an adjustable pad, which may be so

arranged that the artery can be compressed away from the jugular vein and in the direction of the spinal column. [Dr. Corning's instrument has a handle, to which the armatures are attached, which allows the operator to exert his strength to the best possible advantage during the act of compressing.]

“With this and similar instruments I compressed continuously (night and day) the carotid arteries of a number of epileptics, who exhibited all the usual symptoms of the disease (periodicity of attack, frothing at the mouth, biting of tongue, &c.) Although, at the time I began my experiments, some of these patients were having as many as three attacks every twenty-four hours, I was enabled to arrest the convulsions entirely during the space of several weeks—in fact, as long as compression was continued.”—J. L. Corning, M. D., in *Medical Record*, February 18, 1882.

SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4315.
Sherwell's Nasal Scissors.

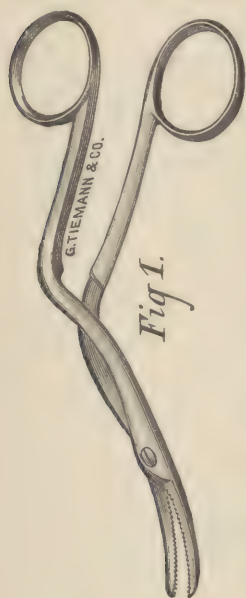


FIG. 4316.
Sherwell's Nasal Scissors.

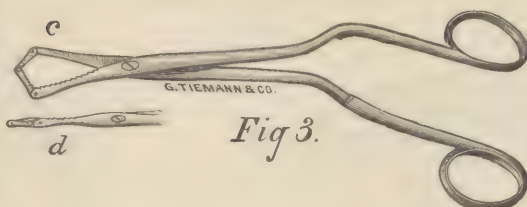


FIG. 4317.
Sherwell's Laryngeal Scissors.

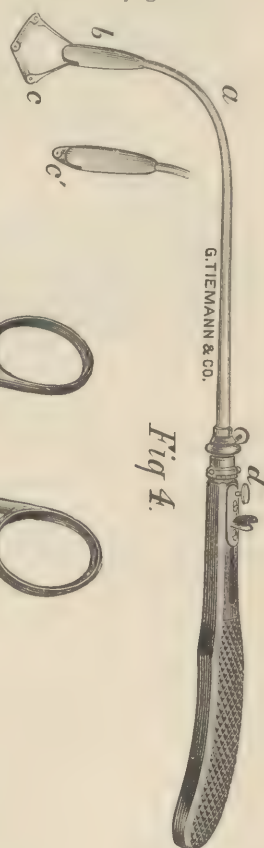


FIG. 4318.—Sherwell's Laryngeal Scissors.

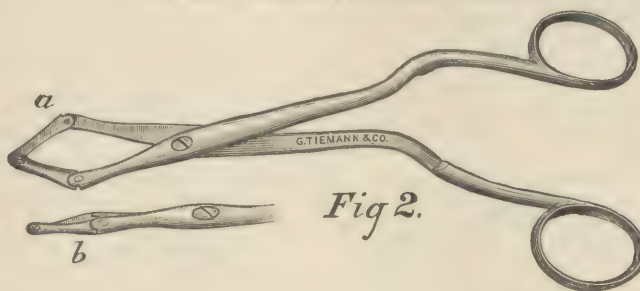


FIG. 4319.—Gleitsman's Laryngeal Dilator.

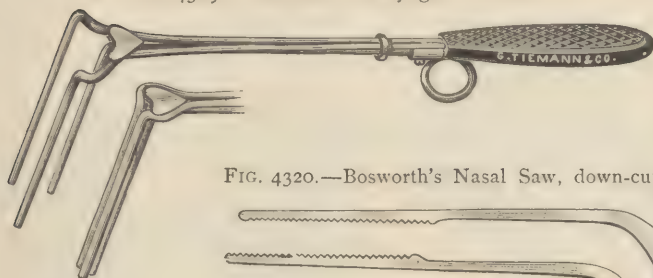


FIG. 4320.—Bosworth's Nasal Saw, down-cut and up-cut.

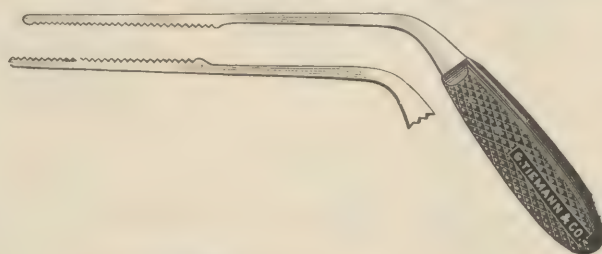


FIG. 4321.—Bucklin's Nasal Saw.

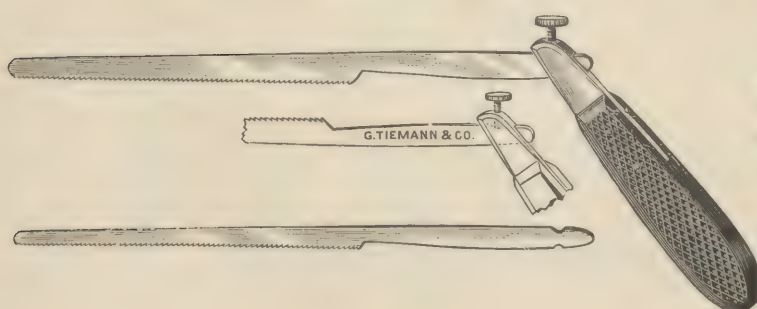


FIG. 4322.
Turnbull's Nasal Speculum.



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4323.—Gerster's Tampon Canula.

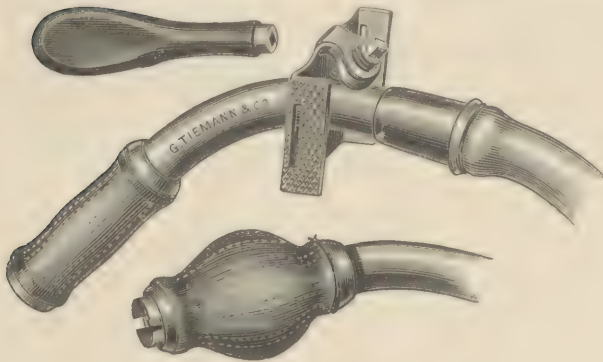


FIG. 4324.—Cohen's Trachea Tube.

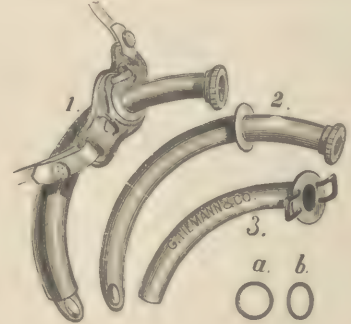
FIG. 4325.
Cohen's Antero-Posterior Pharyngeal Forceps.

FIG. 4326.—Cohen's Wire Snare.

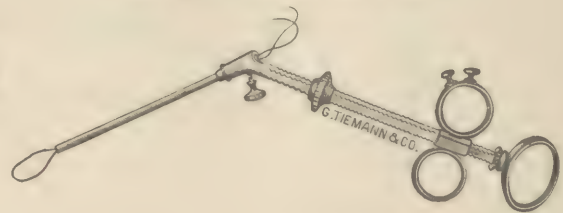


FIG. 4327.—Cohen's Laryngeal Stenosis Dilator.

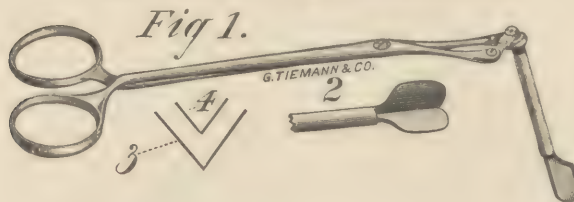


FIG. 4328.—Cohen's Combination Snare.

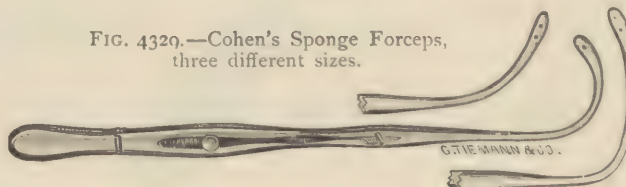
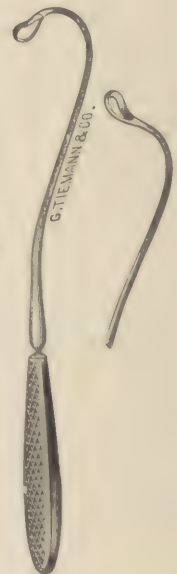
FIG. 4329.—Cohen's Sponge Forceps,
three different sizes.

FIG. 4330.—Cohen's Powder Blower.



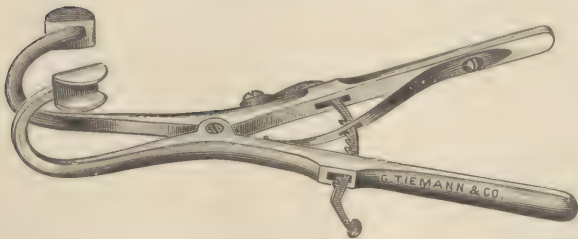
FIG. 4331.—Cohen's Larynx Curette.



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4332.
Denhard's Modification of O'Dwyer's Gag.



"This modification of O'Dwyer's gag I have devised to meet a serious objection to an otherwise excellent instrument. No matter how firmly the child's head is held, the left shoulder is frequently forced against the arms of O'Dwyer's gag, thus displacing the instrument, to the physical discomfort of the physician's finger and possible laceration of the gums or the cheek of the little patient. In the modification, as will be seen in the above cut (Fig. 4332), the arms of the lever are directed straight backward toward the ear, in place of being inclined down as in the original instrument. The assistant, standing behind the patient, can readily include the gag within his grasp while holding the head of the child. The catch also has been modified, the ring of the original being replaced by a dentated spring, allowing the jaws to be separated to the desired degree. The instrument has been used by myself and friend, Dr. Huber, in at least fifty instances with entire satisfaction."—CHARLES E. DENHARD, M. D.

FIG. 4333.
Roswell Park's Aluminium Trachea Tube.

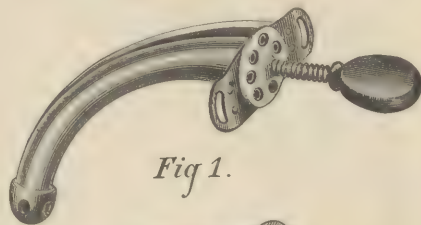


Fig 1.

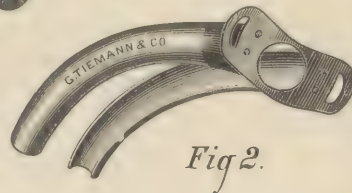
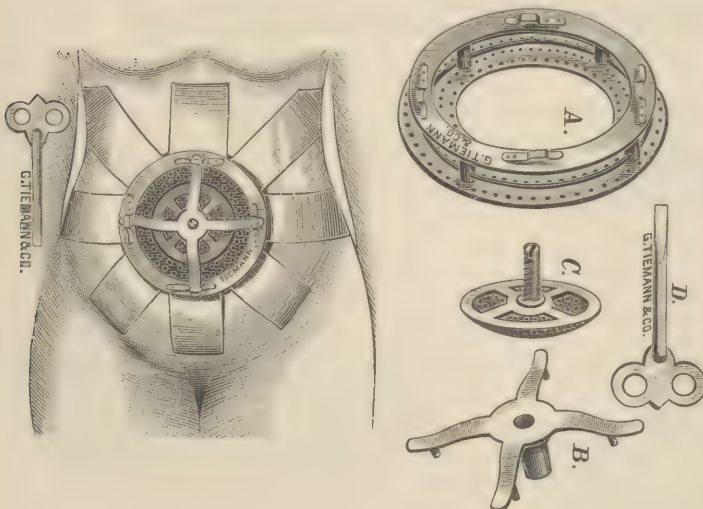


Fig 2.

FIG. 4334.—Wilcox's Umbilical Truss.



A consists of two circular plates of steel connected by four posts. Between the two plates is a stout steel wire running around through the posts. The lower plate, which is the one nearest the skin, is perforated and is covered with perforated chamois skin. Upon the upper plate are four steel spring catches. *C* is the pad, made of woven wire and also covered with perforated chamois skin. The screw of *C* works in the centre piece of *B* and has a loose attachment to the pad, so that when in position, and more pressure is desired, it can be screwed down by the key *D* without scrubbing on the skin of the patient.

The four arms of *B* are made to slip under the four catches in the upper plate of *A*. By means of the screw, the centre pad *C* can be made to project from one-half to one inch below

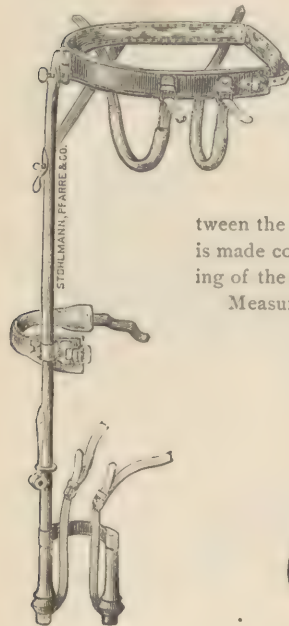
the lower plate of *A*. The whole apparatus is fastened to the body by strips of adhesive plaster, which are attached to the wire between the upper and lower plates of *A*, and which radiate over the abdomen, as shown in the illustration.

The objects obtained by the use of this apparatus are: 1st. The pain in the back is obviated; 2d. By use of the perforated lower plate of *A* and the centre pad *C* the air has constant access to the skin, preventing its chafing; 3d. By screwing down the centre pad, *C*, any amount of pressure desired can be made; and, 4th. When the patient lies down and the bowel is not so likely to come out, the whole centre portion can be instantly removed by giving a little twist sidewise on the arms of *B*, and the skin has a rest from pressure as long as desired.

SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4335.—Wilcox's Foot-piece for Taylor's Hip Splint.



"This consists of a pair of crutch ferules with their rubber tips attached to the lower section of an ordinary Taylor's brace. The two ferules are united by a U-shaped piece of steel passing behind the limb. From the lower end of the ferules run straps of elastic webbing, to be buckled to the adhesive straps on the leg, for the purpose of making extension—counter extension being made in the usual manner by means of the perineal band. The extension is increased by the usual key and ratchet apparatus, which carries the foot-piece with it.

"The advantages of this foot-piece over the ordinary cross-bar are: 1st. It is much easier for the patient to walk, as he does not have to be strung up so high in order to keep him from treading on the cross-bar; 2d. The foot swings free between the ferules without the danger of the patients treading on the cross-bar; 3d. The extension is made constant by means of the elastic straps which take up all the slack caused by the stretching of the adhesive straps."—SIDNEY F. WILCOX, M. D., New York.

Measurements required same as for Sayre's long splints, Figs. 4062, 4063.

FIG. 4336.—Prince's Cocaine Pipette.



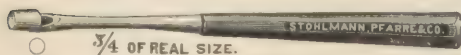
FIG. 4337.—Prince's Shell-plate Eyelid Hook.



FIG. 4338.—Prince's Spool Eye Needle.



FIG. 4339.—Keyes' Cutaneous Punch.



half a millimetre greater than the next one below it. These little instruments, by being placed upon the skin and sharply rotated, will cut out a circular piece of integument of the size corresponding to their own lumen, and the depth of the portion to be excised can be varied according to pressure.

"After the colored spot has been surrounded by the circular incision made by the punch, and shows slightly above the surface, it is seized by a pair of fine toothed forceps, slightly pulled upon, and snipped away with a pair of small scissors curved on the flat. The little bloody pits in the skin are allowed to fill with coagulated blood, and left without any dressing, as the bleeding promptly ceases.

"I have also used the instrument to take away from the face of young ladies, and fastidious young gentlemen, small moles and other disfigurements. I have found it possible, in some instances, by carefully circumscribing the pigmented area, to cut away the colored deposit through the continuity of the true skin, without destroying the entire thickness of the felt sub-papillary layer beneath, in this way removing the discoloration with a minimum of the resulting scar. I think that these uses, and a number of other similar ones which readily suggest themselves, are sufficient to commend this little instrument for general adoption among dermatologists."—KEYES.

FIG. 4340.—Hanks' Perineal Needle.



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4341.—Skene's Wire Ecraseur.

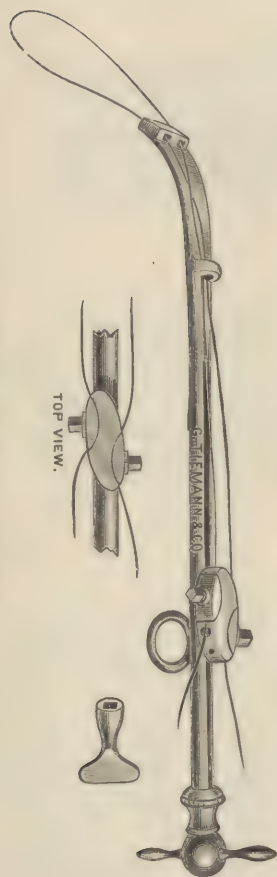


FIG. 4342.—Hanks' Tenaculum, with Steel Shank.



FIG. 4343.—Hank's Combined Tenaculum and Counter-Pressure Hook.



FIG. 4344.—Freeman's Electrolysis Needles.



FIG. 4345.—Fritsch's Uterine Dilators.



FIG. 4347.
Nunn's Pad for Emmet's Speculum.

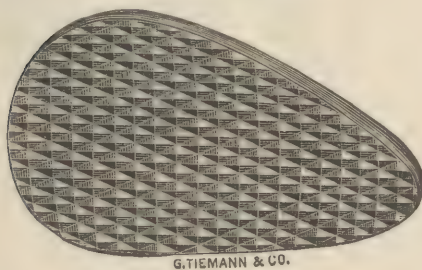


FIG. 4346.—Kelsey's Rectal Retractor.

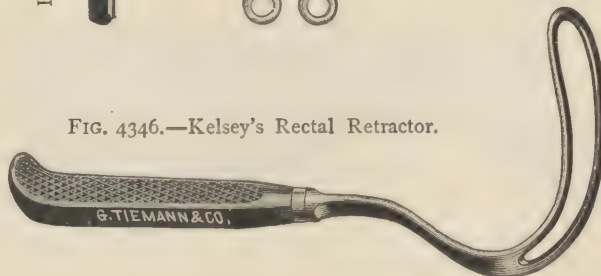


FIG. 4348.
Walker's Rectum Speculum (three sizes in one handle).



FIG. 4349.—Keith's Ligature Forceps.



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

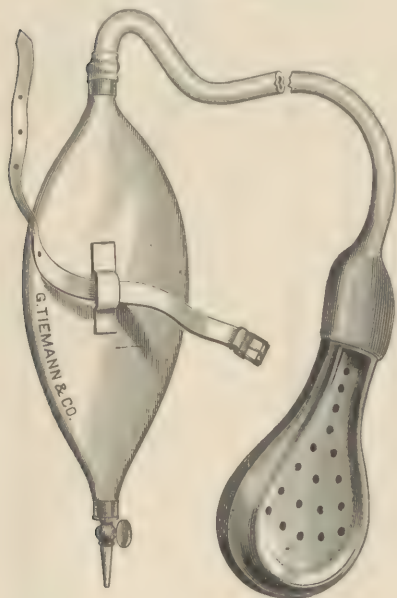
FIG. 4350.—Bozeman's
Utero-Vesical Drainage Support.

FIG. 4351.—Bozeman's Vulvo-Vaginal Drainage Dilator.

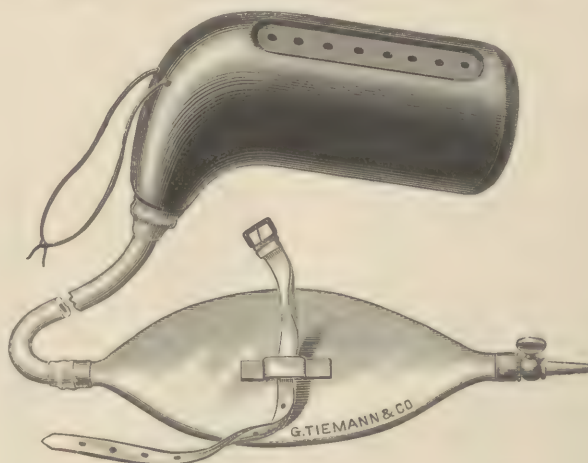
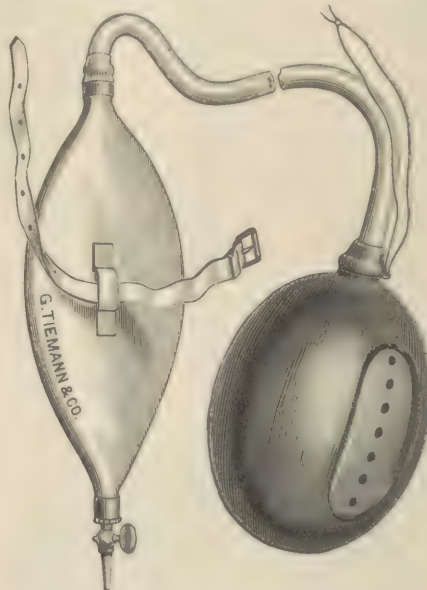
FIG. 4352.
Bozeman's Intra-Vaginal Drainage Dilator.

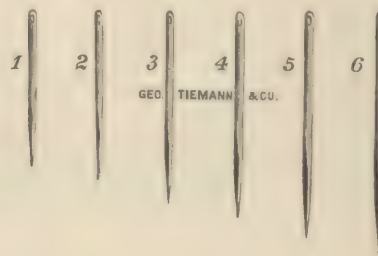
FIG. 4353.—Bozeman's Utero-Vesico-Urethral Drainage Support.



FIG. 4354.—Skene's Pessary, for Prolapsus of the Bladder.



FIG. 4355.—Skene's Button-Hole Scissors, for the Bladder.

FIG. 4356.
Skene's Cervix Needles (actual size).

SUPPLEMENT.

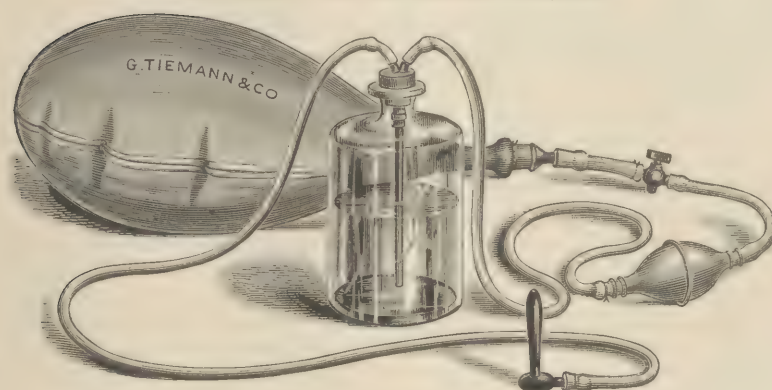
MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

The Treatment of Affections of the Respiratory Passages and of Blood Poisonings
by Gaseous Enemata.

FIG. 4357.—Carbon-dioxide Generator and Reservoir, and Glass Tube containing Volatile Medicament between two Tampons of Cotton.



FIG. 4358.—Filled, and attached to Aspirator.



"The apparatus for generating the carbon dioxide (Fig. 4357) consists of a bottle in which three tablespoonfuls of sodium bicarbonate are placed. The bottle is hermetically closed by a rubber cork with two apertures, through one of which a glass tube extends to the bottom of the bottle, the upper portion being expanded into a funnel and reservoir for the dilute sulphuric acid, beneath which is a stopcock to regulate the descent of the liquid. The second aperture in the cork is filled with a curved glass tube for the escape of the gas, and this exit tube is prolonged by a section of rubber tubing for attachment to a rubber bag of six litres capacity, in which the carbonic acid gas is to be collected. The mouth of this bag is furnished with a stopcock. The sodium bicarbonate being placed in the bottle, the cork is inserted, and the stopcock of the sulphuric acid reservoir is closed. This reservoir is then filled with the dilute sulphuric acid, say four ounces, and the stopcock is turned so as to allow the acid to drip on the soda. The carbonic acid gas is evolved immediately, the activity of the disengagement being controlled

by the stopcock. A little gas is allowed to escape into the atmosphere, so as to drive off the atmospheric air in the bottle. Meanwhile the reservoir is rolled tightly, so as to drive out all the air it contains, as far as possible, and is then attached to the exit tube for the gas and allowed to become filled with the carbonic acid. It is then removed and its stopcock is closed. It must be removed before the stopcock is turned, in order that pent-up gas in the bottle shall not break the apparatus. This is one of the points to which the physician must direct the attention of his nurse before entrusting the patient to the attendant. Another point upon which stress must be distinctly laid is the rolling of the bag to prevent retention of atmospheric air.

"The gas is now ready for use. The reservoir is attached to a handball aspirator with check valves at each end (Fig. 4358). This is attached to a metallic T tube, passing through a cork which is intended to be placed in the neck of a bottle containing the medicated solution, preferably a highly charged natural sulphur water. The vertical portion of the tube is furnished with a double valve, to prevent aspiration of the liquid through which the carbonic acid gas bubbles, and contains an orifice at top for the escape of the gas into the distal horizontal branch, to which is attached a tube connected with a nozzle for introduction into the rectum. This T branch is placed in a bottle three-fourths filled with the sulphurous water—in this instance the Red Sulphur Spring Water of Virginia—and the aspirator is worked two or three times to drive out the atmospheric air in the bottle: another point to which the physician must emphatically direct the attention of his nurse. The nozzle is then inserted into the rectum of the recumbent patient and the injection made slowly. All clothing must be loose. With the hand on the abdomen, the amount of distention

SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

The Treatment of Affections of the Respiratory Passages and of Blood Poisonings by Gaseous Enemata.

of the colon is noted, and when this is marked, or when pain is complained of, the process is suspended until absorption takes place, as manifested by relaxation of the tension; and then the process is resumed. Fifteen to twenty minutes are consumed in the process of driving the six litres of carbon dioxide through the sulphur water. The sulphur salt—*e. g.*, sodium sulphide—is decomposed, hydrogen sulphide being formed, a portion of the carbon dioxide taken up to form sodium carbonates.

"The only modification of the process I have permitted myself (for I deem it due in justice to Dr. Bergeon and Dr. Morel to test their method of administering the gas in their own way) is to place the mineral water bottle in a bath of warm water, which renders the injection more grateful. Within four minutes, sometimes within one, the sulphuretted hydrogen can be perceived in the breath, and be detected by paper saturated with plumbic acetate. It is prudent to have a bed-pan at hand in case there should be a call to stool. The injection should not be made upon the full stomach. This may produce emesis, it is said. You want all the room possible in the abdomen to prevent pressure upon a distended stomach and upon the diaphragm.

"Three or four hours after a meal, or just before one, is the best time for injection. Two injections are given daily. I have found three hours after breakfast and three hours after supper the best periods. My patients have slept better after an injection just before bedtime, than after one, three or four hours after the midday meal.

"At the first injection but half the contents of the reservoir of carbonic acid should be used, so that the parts and the system may be gradually accustomed to the process.

"If the bottle of sulphurous water remain strongly impregnated after the injection, it may be tightly corked for use a second time. It is not necessary to have the bowels moved before an injection. Hæmoptysis and the presence of the menstrual period do not contraindicate the process. Indeed, Dr. Bergeon has seen amenorrhœa relieved during this treatment, even when that condition had failed to yield to the ordinary methods of treatment.

"When the pulmonary lesions are extensive, and, in consequence, elimination of the gas takes place slowly, the injections must be made very slowly, or they will produce sensations of fulness in the thorax and in the abdomen.

"Now, as to therapeutic results. All published observations recount rapid amelioration of the suppurative phenomena; a marked diminution in cough, expectoration, dyspnoea, and night-sweats being noted within two or three days. Similar prompt improvement, with reduction of temperature, has been noted in some of my own cases, not in all. Some of his more than two hundred patients Dr. Bergeon considers cured. These, he states, no longer expectorate, and present no other stethoscopic evidences than the dry sounds due to cicatrized or cicatrizing cavities, or to cicatricial bands consecutive to old lesions. Some of them have been able to resume laborious occupations, and to ascend several flights of stairs many times a day without injury to their respiratory apparatus, or loss of the ameliorated condition which had been secured. Some, who considered themselves cured at the end of a few weeks, abandoned treatment, despite the advice of Dr. Bergeon, and underwent recurrence. It is, therefore, important that the treatment should be continued for some months, until all the pulmonary lesions have been cured, lest incompletely cicatrized surfaces undergo suppurating afresh, and reproduce septicæmia. They should be renewed from time to time, even after apparent cure, and especially upon any reappearance of cough, expectoration, fever or emaciation.

"Not only are pulmonary lesions said to be cured by these enemata, but pharyngeal and laryngeal tuberculous ulcerations are said to undergo cure likewise, and that without any topical applications whatever, simply from the contact of the gas in its elimination from the lungs.

"Of the cases treated under my own supervision I have as yet little positive to state. With a single exception, they have done quite well so far, and some of them are very pronounced cases—cases that I have had no hope of benefiting very greatly by any treatment with which I am more familiar. One of my patients insists that she is well, but she is not. Some of these cases are here for the purpose of receiving the treatment in your presence. They will answer for themselves that they are better in several ways. Hope of recovery has much to do with this, but not all. I went through a similar experience more than twenty years ago with inhalation of oxygen in phthisis. Hope buoyed the patients up until they found that oxygen had not the power of curing them, and then some of them, I fear, sank all the sooner for the disappointment. In the present instance the prospect is better, the treatment being more in accord with scientific principles, despite the awkwardness of the method. In the one instance it is hardly to be supposed that your patients will have been injured; in the other, they will have had all the advantage of an early resort to a beneficial agent.

"Should it be desired to administer some volatile medicament, as iodoform, carbon sulphide, eucalyptol, or the like, the bottle of mineral water is replaced by a bottle of common or distilled water, and between the T tube and the injection-pipe a glass tube is inserted, in which the volatile substance has been introduced between tampons of cotton."—*The Medical News*, April, 2, 1887. J. Solis-Cohen, M. D.

SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4359.—Wyeth's "United States" Scale.

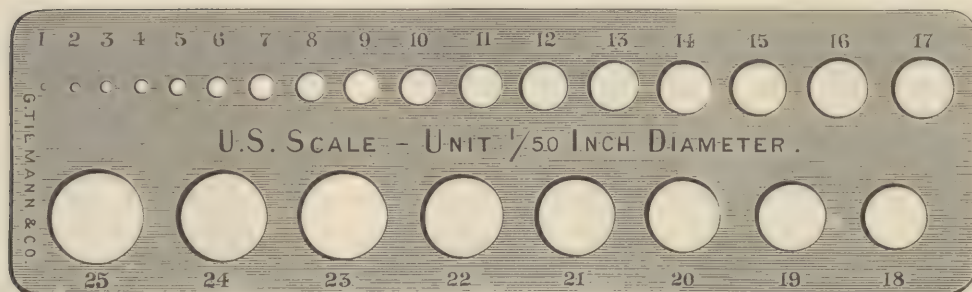


FIG. 4360.—Wyeth's Conical Steel Bougies (straight and curved).

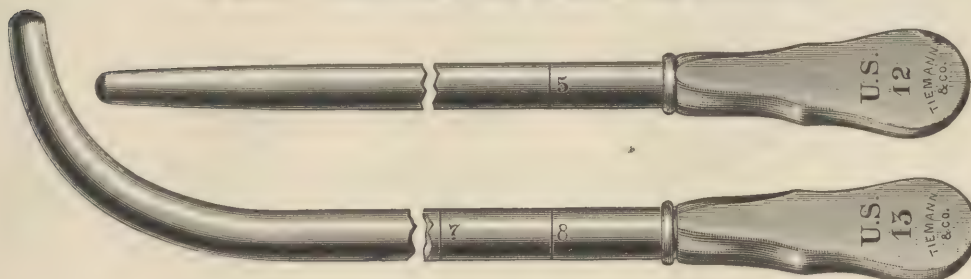


FIG. 4361.
Keyes' Perineal Retractor, for holding up upper angle
of the vesical wound in Supra-Pubic Cystotomy.



FIG. 4362.—Keyes' Device
for applying Perineal Drainage through the smallest possible
perineal incision in cases of Supra-Pubic Cystotomy.

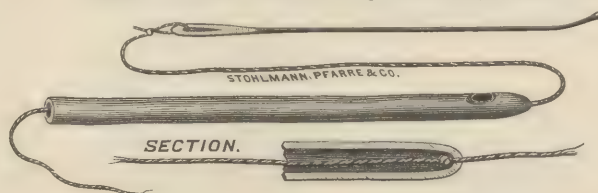


FIG. 4363.
Kiefer's Urethral Irrigation Nozzle.



FIG. 4364.
Keyes' Tube for Supra-Pubic Vesical Drainage.



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4365.—Otis' Latest Urethrometer.

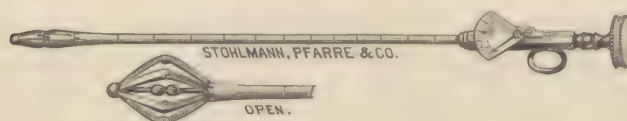


FIG. 4366.—Klotz's Endoscope.

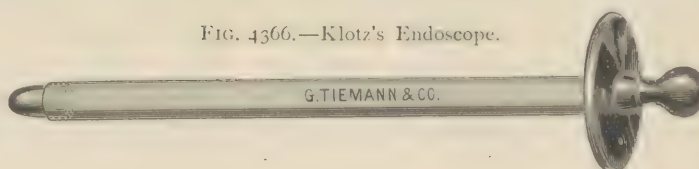


FIG. 4367.—Abbott's Combined Curette and Double Catheter.

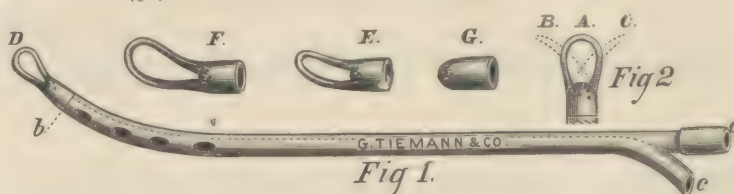


FIG. 4369.—Rushmore's Grooved Velvet-eye Catheter.

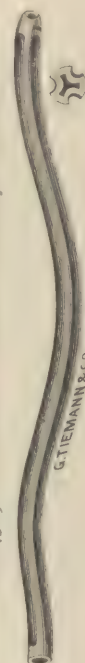


FIG. 4370.—Walker's Urethrotome.

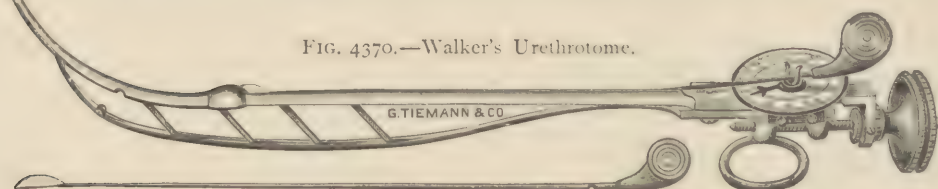


FIG. 4371.—Woodward's Syringe for Nitrate of Silver Applications to the Uterus.

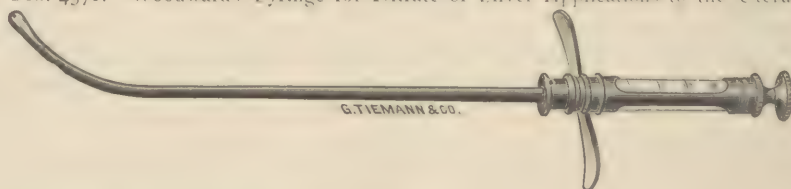


FIG. 4372.—Fluhrer's Aluminium Bullet Probe.



FIG. 4373.—Bozeman's Renal Sound.



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4374.
Gerster's Iodoform Duster.



FIG. 4377.
Hæmostatic Needle.



FIG. 4381.—Diefenbach's Needle Forceps.

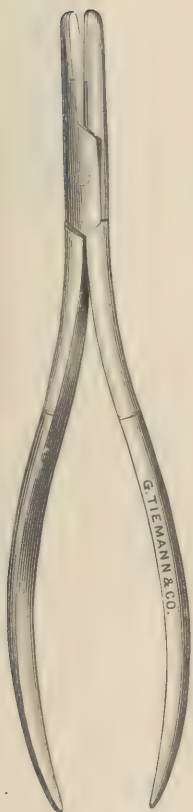


FIG. 4382.—Dawbarn's Aseptic Saw.



FIG. 4375.—Large Blunt Hook.



FIG. 4376.—Small Blunt Hooks and Retractor.

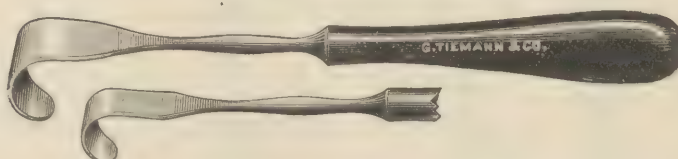


FIG. 4378.—Thiersch's Spindles and Forceps.

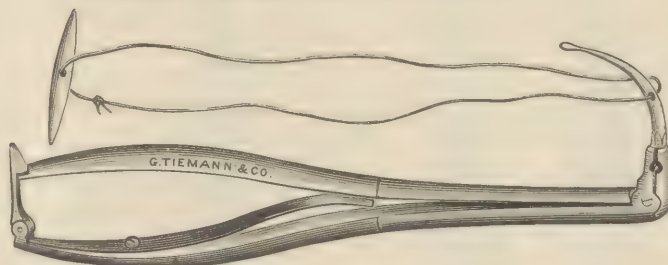


FIG. 4379.—Van Arsdale's Set of Periosteum Elevators.

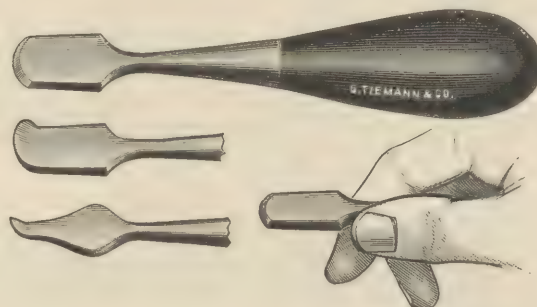


FIG. 4380.—Sharp Periosteum Lever.



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4383.—Gerster's Chisels.

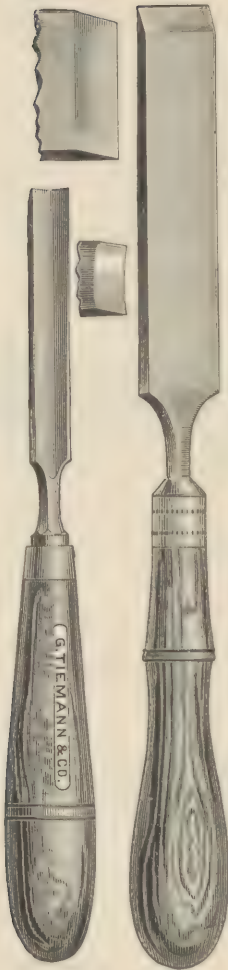


FIG. 4384.—Gerster's Mallet.

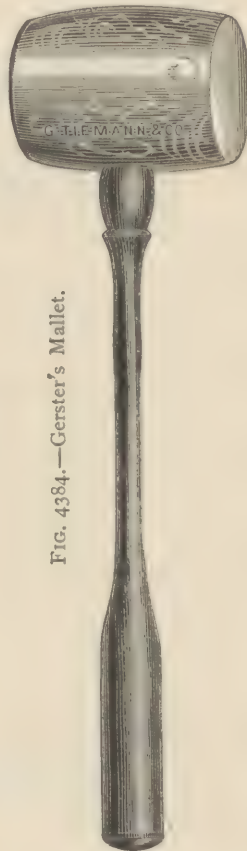


FIG. 4385.—Volkmann's Retractor.



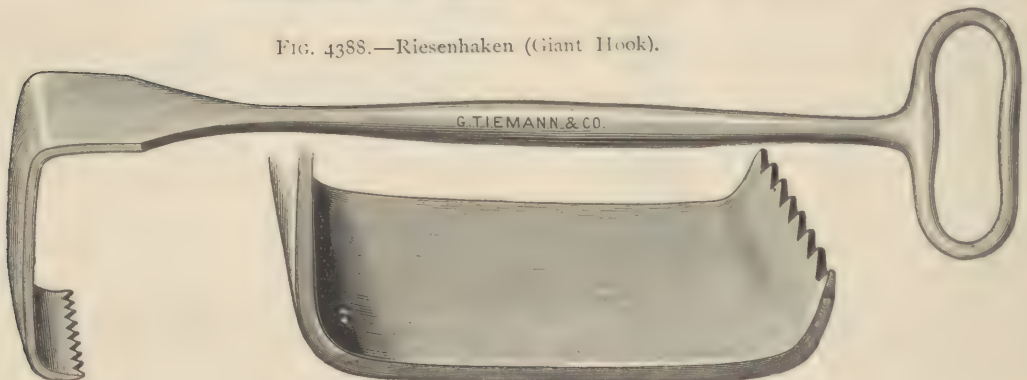
FIG. 4386.—Volkmann's Spoon.



FIG. 4387.—Hahn's Artery Forceps.



FIG. 4388.—Riesenhaken (Giant Hook).



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4389.—G. Tiemann & Co.'s Patent Needle Forceps, with either Rectangular or Oblique Jaw.

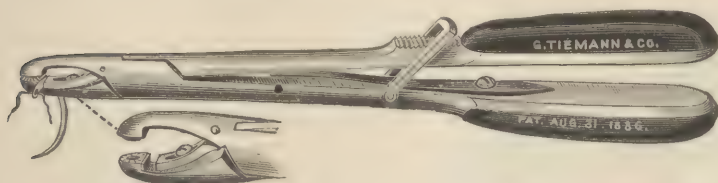


FIG. 4390.—Dawbarn's Needle Forceps.

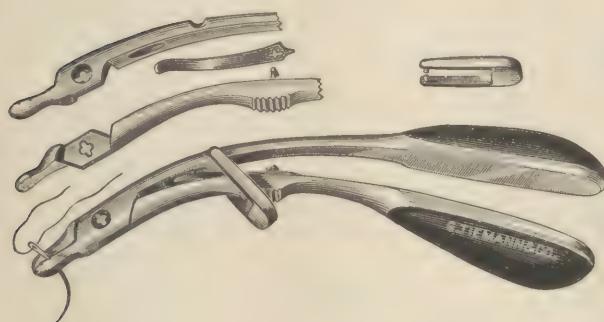


FIG. 4392.—Flood's Artificial Leech Glass, to attach to Tiemann & Co.'s Aspirator.

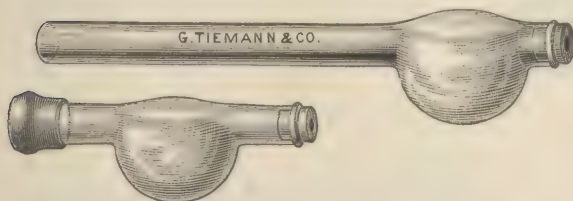


FIG. 4394.—Getz's Set of Aspirating Trocars.

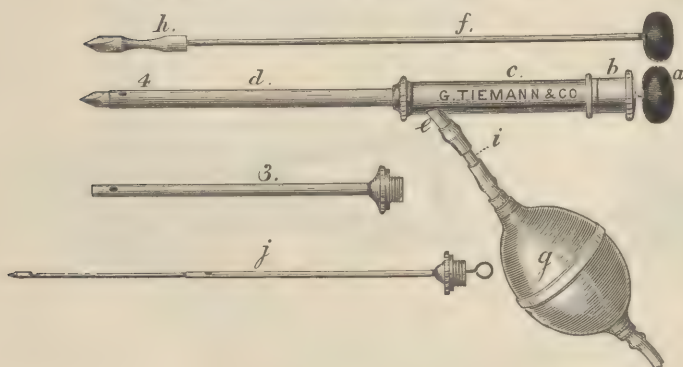
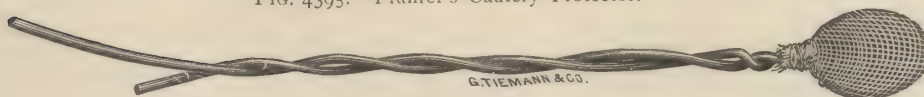


FIG. 4395.—Fluhrer's Cautery Protector.



The usual round or triangular needles are grasped by the jaws at the apex, while the flat Hagedorn needles—either straight, half or full curved—are firmly held in a rectangular or oblique position by the sliding bar on one side of the jaw, as shown in the accompanying cut. The ordinary needles are withdrawn from the suture by the front jaws, the Hagedorn needles by the slide lever.

The hard-rubber handles being vulcanized on (baked on) the steel shanks makes the instrument aseptic.

FIG. 4391.—Lavage Apparatus, for Washing the Stomach.

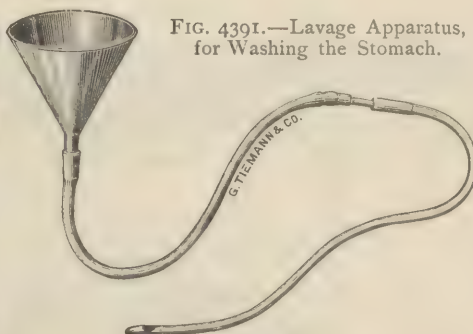
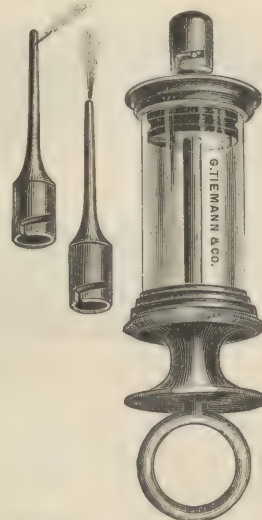


FIG. 4393.—Sexton's Ear. Syringe, with Air-Tight Cap.



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4396.—Dr. Daggett's Examining and Operating Table, No. 1.



Table No. 2.

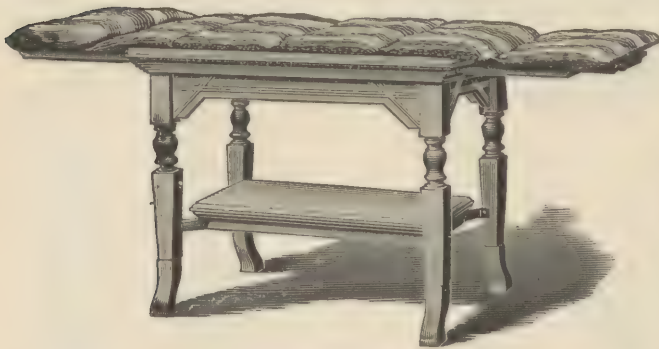
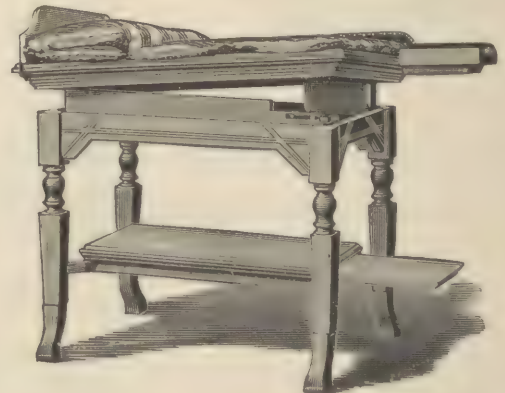


Table No. 3.



Table No. 4.



These tables are without the complicated mechanical appliances required to adjust a chair or lounge to such purposes.

Figure No. 1 exhibits the table closed. It will be observed that the platform is carried in out of the way, so that a person may sit at the table for writing, reading, &c.

Figure No. 2 exhibits the same with a slide drawn out at each end, thus making it a six-foot examining or operating table. The platform and sliding step serve as a convenient shelf.

Figure No. 3 exhibits the same as gynæcological table arranged for the back position. The portable and combined head board, knee guide and ankle rest are in place, the ankle rest being turned back. The adjustable stirrups and the step are drawn out.

Figure No. 4 exhibits the gynæcological table arranged for the side or Sim's position. The ankle rest is swung into place. The declinations may be given either before or after the patient takes her place, by lifting the top at its side or end respectively, and are supported by automatic rails. These rails work together or independently.

With this adjustment the patient is directed to take her place upon the step, arrange her clothing, rest her left thigh across the end of the table, guide her left knee against the rail, lay her head upon the pillow, carry her left arm backward and her left leg upon the ankle rest, and draw the right leg upon the rail. This will give her Sim's position.

There are three grades of these tables made:

FIRST GRADE—Has no platform, and is made of the cheaper woods; has the side rail and ankle rest. Price, \$25.

SECOND GRADE—Has a single slide for step and platform, the hinged rail and ankle rest. Price, \$35.

THIRD GRADE—Has engraved legs, double platform, high head board, and elegant finish, and is made of the best woods. Price, \$45.

For upholstered tops add five dollars to these prices.

We also make a folding cushion adaptable to these tables, which cost from three to twenty dollars. With an upholstered top only a pillow is required. Tops are finished in wood unless otherwise ordered.

SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4397.—Ware's Ligature Bottle.



FIG. 4398.—Shufford's Rectal Speculum.

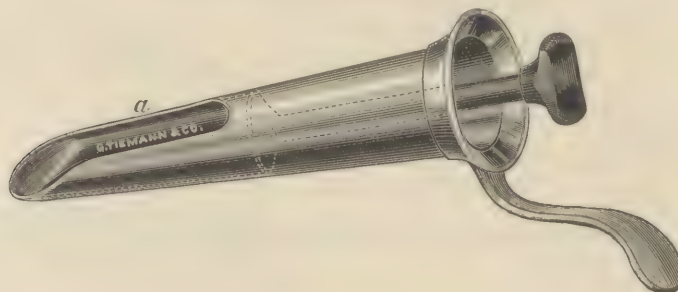


FIG. 4399.—Walker's Drainage Tubes.



FIG. 4400.—Thomas' Clamps, for compressing vaginal wounds.



FIG. 4402.—Blitz's Canalicula Dilator.

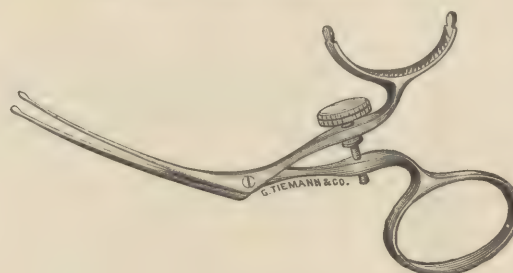


FIG. 4401.—Otis' Malignant Hook.

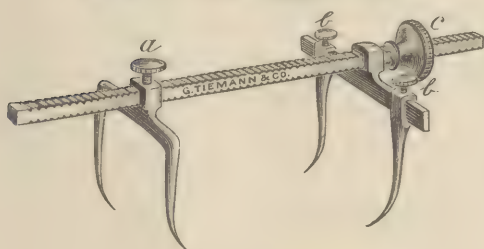


FIG. 4403.—Carmalt's Punch for Transplantation.



FIG. 4404.—Tape Measure.



FIG. 4405.—Bozeman's Delicate Knife.



SUPPLEMENT.

MISCELLANEOUS INSTRUMENTS AND APPLIANCES.

FIG. 4406.—Nœggerath's Clamp for Prolapsed Vaginæ.



FIG. 4407.—O'Dwyer's Laryngeal Snare.

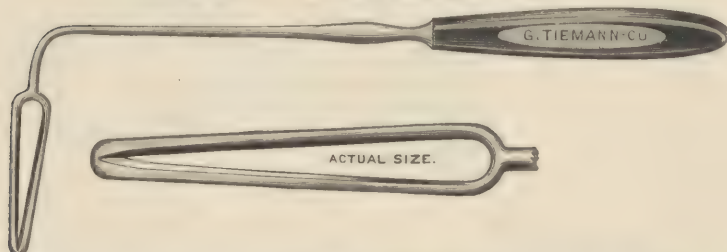


FIG. 4408.—Cleborne's Artery and Tissue Forceps.

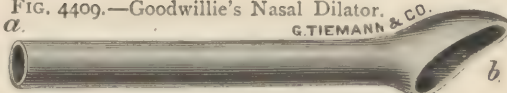
FIG. 4409.—Goodwillie's Nasal Dilator.
a.

FIG. 4410.—Hanks' Uterine Scissors.



FIG. 4411.—Keyes' Stone Searcher.



FIG. 4412.—Woodward's Speculum Vaginæ.



FIG. 4413.—Reverdin's Needle.



FIG. 4414.—Whitehead's Urethrotome.



THE METRIC SYSTEM.

Certain French scientists of the last century, in order to establish a universal cosmopolitan measure, proposed to base our conceptions of size, weight and money on the well-known and beautiful Decimal System of numbers—this being understood by all men alike, however different in nationality or language.

The terms applied to the length-unit, “Metre,” and to the weight-unit, “Gramme,” were taken from the Greek language. The names expressive of *fractions* of the above, are formed by combination with the following Latin words:

<i>Latin.</i>		
<i>Decem</i> , ten,	Decimetre,	equal to 0.1 Metre.
<i>Centum</i> , hundred,	Centimetre,	“ 0.01 “
<i>Mille</i> , thousand,	Millimetre,	“ 0.001 “

The terms applied to the upper divisions, expressing certain pluralities of the same, are formed of synonymous words taken from the Greek.

<i>Greek.</i>		
<i>δέκα</i> , ten,	Decametre,	equal to 10 Metres.
<i>έκατον</i> , hundred,	Hectometre,	“ 100 “
<i>χιλιοι</i> , thousand,	Kilometre,	“ 1,000 “
<i>μύριοι</i> , ten thousand,	Myriametre,	“ 10,000 “

GRAMME, the <i>weight</i> measure, is divided into—			LITRE, the <i>capacity</i> measure, is divided into—		
Deci-	Centi-	Milli-gramme.	Deci-	Centi-	Milli-litre.
Deca-	Hecto-	Kilo-gramme.	Deca-	Hecto-	Kilo-litre.

Arranged into a Table it reads thus:

LENGTH.		WEIGHT.	
10 Millimetres	make 1 Centimetre.	10 Milligrammes	make 1 Centigramme.
10 Centimetres	“ 1 Decimetre.	10 Centigrammes	“ 1 Decigramme.
10 Decimetres	“ 1 Metre, equal to 39.368 American inches.	10 Decigrammes	“ 1 Gramme, equal to 15.433 grains Troy.
10 Metres	“ 1 Decametre.	10 Grammes	“ 1 Decagramme.
10 Decametres	“ 1 Hectometre.	10 Decagrammes	“ 1 Hectogramme.
10 Hectometres	“ 1 Kilometre.	10 Hectogrammes	“ 1 Kilogramme.
10 Kilometres	“ 1 Myriametre.	10 Kilogrammes	“ 1 Myriagramme.

CAPACITY.

10 Millilitres	make 1 Centilitre.
10 Centilitres	“ 1 Decilitre.
10 Decilitres	“ 1 Litre, equal to 2.113 pints American.
10 Litres	“ 1 Decalitre.
10 Decalitres	“ 1 Hectolitre.

WEIGHT OF WATER

AT MAXIMUM DENSITY.

Millier (or Tonneau).....	1,000,000	Grammes, equal to	1 Cubic Metre.
Quintal.....	100,000	“ “	1 Hectolitre.
Myriagramme.....	10,000	“ “	10 Litres.
Kilogramme (or Kilo).....	1,000	“ “	1 Litre.
Hectogramme.....	100	“ “	1 Decilitre.
Decagramme.....	10	“ “	10 Cubic Centimetres.
Gramme.....	1	“ “	1 “ “
Decigramme.....	0.1	“ “	0.1 “ “
Centigramme.....	0.01	“ “	10 “ Millimetres.
Milligramme.....	0.001	“ “	1 “ “

Square and Cubic Measures are deduced by arithmetic rules: A Square Decametre is called “Are”; a Cubic Metre is called “Stere.”

INDEX AND PRICE LIST.

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
4367	764	Abbott's Curette and Double Catheter	\$6.00	1064	10	Æsthesiometer, Sieveking's	\$4.00
3309	454	Wire Cutter	6.00	1067	10	Vance's	5.00
2808	329	Abdominal Bandage	6.00		10	Æsthesiometric.	
2805	328	Belt, Elastic, Cotton	8.00	3836	561	Agnew's Adjuster and Forceps	2.50
		Belt, Elastic, Silk	12.00	1809	148	Canalicula Knife	1.75
		Belt, Canvas	4.00	1824	149	Eye Douche	3.50
		Belt, Riding, with Stays, lined with Chamois	6.00	2768	318	Hernia Instrument	6.00
		Belt, Satin Jean	6.00	1897	162	Iridectomy Knife	1.75
3731	533	Needle, with Fixed Handle	.75	1823	149	Lachrymal Syringe	5.00
2751	312	Pad, for application of Heat or Cold	8.00	3835	561	Needle Holder and Needles	4.50
3733	533	Pad, for application of Heat or Cold	8.00	3836	561	Seizing Forceps	2.50
	520	Section, see Laparotomy and Ovari-otomy.			179	Set of Eye Instruments	66.50
		Supporter, Boston	6.00		562	Set of Instruments for Ruptured Pe- rineum	24.35
2801	328	Supporter, Bow-spring	4.00 to 5.00		154	Strabismus Hook, with Eye	1.25
		Supporter, Braun's	6.00	1980	175	Spring Tattoo	4.50
		Supporter, Dugas'	5.00	1983	175	Tattooing Needle	2.00
2802	328	Supporter, Eugene's	6.00	2584	285	Air Pump and Receiver, Sass'	
2803	328	Supporter, Fitch's	4.00 to 6.00	2587	285	Air Pump, Double-acting	
2809	329	Supporter, Hofman's	6.00	2585	285	Novelty	
2804	328	Supporter, London	5.00	2421	251	Air Receiver	
2807	328	Supporter, Noeggerath's	6.00	2422	251	Air Receiver	
		Supporter, Phelps'	5.00	2423	251	Air Receiver	
		Supporter, Thomas'	8.00	2424	251	Air Receiver	
1420	87	Abscess Knife and Scalpel	2.75	289		Alimentary Canal, see also (Esophageal, Rectal and Stomachal.	
1419	87	Lancet	1.00	303		Alimentation by the Rectum, see also Rec- tal Feeding, Infusion, and Rectal Injec- tors and Irrigators.	
	740	Achilles, Tendo.		2066	193	Allen's Polypus Forceps	4.50
2021	186	Acoumeter, Politzer's	3.50	3061	399	Alligator Forceps, Urethral, Curved	6.00
		Acoustic, see Ear Trumpets, Stethoscopes and Tuning Fork.		3060	399	Straight	5.50
	39	Actual Cautery.		2730	310	Allingham's Ligature Carrier	3.50
1240	39	Blowpipe	4.00	2367	237	Mouth Gag (Annandale's)	7.00
1239	39	Blowpipe, Wight's	11.00			Pile Clamp	12.00
1242	39	Irons, each	1.50	2690	306	Scissors and Director	7.00
2743	312	Irons, each	1.50	1473	93	Allis' Acupressure Forceps	2.00
1241	39	Irons, set	4.50	1474	93	Acupressure Forceps	1.75
1243	39	Irons, set	5.50	1475	93	Acupressure Forceps	1.75
2742	312	Irons, set	4.50	1479	93	Acupressure Forceps	1.75
2732	311	Irons, Smith's Serrated, set	6.00	1480	93	Acupressure Forceps	1.75
1238	39	Nævus Needle	.50	1249	43	Ether Inhaler	4.00
1479	93	Acupressure Forceps, Allis'	1.75	2762	316	Herniatome	7.00
1480	93	Allis'	1.75	1323	80	Suture Forceps	2.00
1473	93	Allis'	2.00	1040	6	Allison's Differential Stethoscope	4.50
1474	93	Allis'	1.75	1925	164	Althof's Iridectomy Scissors	5.00
1475	93	Allis'	1.75	4029	627	Aluminium Caustic Holder	2.25
1478	93	Milne's	1.50			Probe, Pocket Case, pair	.75
1469	93	Acupressure Pin	.25			Probe, Uterine	1.25
2703	307	Acupuncture Trocar	1.50	2552	278	Trachea Tube, Little's	6.00
2706	308	Adams' Hæmorrhoidal Syringe	4.50	1365	83	American Bullet Forceps, G. T. & Co.'s	2.25
1920	163	Iris Knife	1.50	2844	340	Scale for Urethral Instruments	3.50
2215	217	Rhinoplastos	3.00	3785	548	Amniontome, Wenck's	2.50
1632	110	Subcutaneous Section Knife	1.50		63	Amputating Case, T. & Co.'s Compact Set.	38.50
1633	110	Subcutaneous Section Saw, Large	4.00		63	T. & Co.'s Set, No. 1	25.00
1634	110	Subcutaneous Section Saw, Small	3.50		63	T. & Co.'s Set, No. 2	30.00
		Adhesive Plaster, Moleskin, per yard	1.50		63	T. & Co.'s Set, No. 3	35.00
		on Twilled Goods, per yard	1.50		96	Amputating Knives, Aseptic Handles:	
		Plain, per yard	.75	1510	96	Bistoury, Probe-pointed	1.50
	157	Advancement of the Rectus:		1509	96	Bistoury, Sharp-pointed	1.50
1882	157	Forceps, Prince's	2.00	1505	96	Catling, Long	5.00
1883	157	Needle, Prince's	2.50	1506	96	Catling, Medium	4.00
3578	501	Ady's Uterine Dilator	14.00			Catling, Small	3.00
1065	10	Æsthesiometer, Carroll's	4.00	1507	96	Finger Knife	2.50
1068	11	Elsberg's	7.00	1508	96	Finger Knife	2.00
1066	10	Hammond's	3.00				

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
	96	Amputating Knives, Aseptic Handles :				Anatomical Models, imported to order.	
1502	96	Liston's Knife, Long.....	\$5.00	1100	14	Anatomical Syringe	\$35.00
1503	96	Liston's Knife, Medium.....	4.00	671		Anchylolysis.	
1504	96	Liston's Knife, Small	3.00			Apparatus, see Orthopædic : Diseases	
1512	96	Scalpel	1.50			of the Joints.	
1513	96	Scalpel	1.50	4113	667	Andrew's Apparatus for Inflamed Ankle	
1514	96	Scalpel	1.50			Joint	
1515	96	Scalpel	1.50	1447	91	Andrew's Artery Forceps	2.50
1516	96	Scalpel	1.50	4021	626	Artery Forceps	2.50
	95	Amputating Knives, Ebony Handles :			670	Elbow-Joint Splint	
1491	95	Cartilage Knife	1.50	4133	676	Instrument for Straightening Bent	
1492	95	Cartilage Knife	2.00			Knee	
	95	Catling, Long	4.50	4094	658	Knee-Joint Splint.....	
	95	Catling, Medium	3.50	4057	638	Morbus-Coxarius Splint	12.00
1495	95	Catling, Small	2.50		67	Pocket Case	28.00
1501	95	Conant's Knives and Saw, set	10.00	4144	685	Spine Brace	20.00
1499	95	Liston's Long	4.50	3070	400	Stone Searcher	2.50
		Liston's Medium	3.50		670	Wrist Splint	
1497	95	Liston's Small	2.50	1820	149	Anel's Eye Syringe, Silver, with Silver and	
1498	95	Parker's.....	5.50			Gold Point, in Case.....	12.00
1500	95	Wight's Folding	5.50	1820	149	Anel's Eye Syringe, Hard Rubber, with Silver	
1496	95	Wood's Circular	4.00			and Gold Point, in Case.....	5.00
1490	95	Scalpel	1.50	1786	147	Anel's Probe	.50
1493	95	Scalpel	1.00			Aneurism Needle, see Artery Needle.	
1529	97	Amputating Saw, Bow, T. & Co.'s.....	8.50	2050	191	Angular Ear Hook	1.50
1528	97	Capital, Parker's	5.00	2013	185	Ear Probe.....	.75
1527	97	Capital, Satterlee's	5.00	2717	309	Pile Needle.....	1.00
1526	97	Capital, T. & Co.'s.....	5.00	2708	308	Pile Scissors	1.50
1530	97	Lewis' Folding	2.50	1404	85	Scissors, Operating.....	1.50
1525	97	Lifting Back, Large	4.00	1880	154	Scissors, Strabismus.....	1.50
		Lifting Back, Medium	3.00	4135	678	Angular Curvature of Spine.	
1522	97	Lifting Back, Small.....	2.50		74	Animal Ligature, Dry, per yard	.25
1521	97	Metacarpal	1.50			Lister's American, per bottle	.50
1524	97	Metacarpal, Detmold's	1.50			Lister's English, per bottle.....	.75
1523	97	Metacarpal, Lente's	1.50			Silk-worm Gut, per coil.....	.03
		Amputating Scissors, Cervix Uteri, see				Whale Tendon, per coil.....	.40
		Hysterectomy.		4202	710	Ankle, Brace for Weak	5.00 to 10.00
1489	95	Amputating Tenaculum	1.25	4201	709	Detmold's Spring for	4.00 to 6.00
1494	95	Amputating Tenaculum	1.00	3959	601	Splint for Fracture of, Left	.75 to 1.50
		Aseptic Handle	1.50	3960	601	Splint for Fracture of, Right	.75 to 1.50
	63	Amputating and Trepanning Set.....	44.25	1156	24	Ankle Band, Voltaic	1.00
2740	311	Amusat's Hæmorrhoidal Clamp and Cau-		4108	665	Ankle Compressor, Sayre's.....	6.00
		tery	8.00	4113	667	Ankle-Joint, Andrew's Apparatus for In-	
	48	Anæsthesia, Local.				flamed	
1259	48	Richardson's Spray for, Silver.....	5.50	665		Ankle-Joint, Apparatus for Diseased.....	
	43	Anæsthetic.		663		Diseases of the.	
1249	43	Anæsthetic Inhaler, Allis'.....	4.00	4112	667	Hutchison's Splint for.....	
1252	45	Cheatham's	3.50	4108	665	Sayre's Rubber Compressor for	6.00
1251	44	Chisolm's	2.50	4109	666	Sayre's Splint for	22.00
1256	47	Heuel's.....	10.00	4114	668	Stillman's Splint for	15.00 to 20.00
1253	45	Hutchison's.....	4.00	2367	237	Annandale's Mouth Gag	7.00
1258	48	Junker's Methylene.....	12.50	692		Anterior Curvature of the Spine, see also	
1248	43	Lente's	3.50			Spinal (Lordosis) Braces.	
1255	46	Mitchel's	2.00		720	Anterior Curvature of Tibia.	
1257	48	Morton's	5.00	4231	720	Brace for Correcting	12.00 to 18.00
2575	283	Nichols'	5.00	3975	608	Anterior Splint, Smith's.....	3.00
1254	46	Speirs'-George's.....	3.50		50	Antiseptic, see also Aseptic.	
1250	44	Squibb's	1.50		96	Amputating Knives, see Aseptic Am-	
3687	520	Thallon's	20.00			putating Knives.	
	207	Anal, see also Rectal.		3853	566	Antiseptic Ball.	
2647	300	Dilator	10.00	1260	49	Antiseptic Spray, Hank's	15.00
2650	300	Dilator, Sims'	4.50	1263	50	Heuel's.....	6.00
2652	300	Dilator, Thebaud's, Sphincter Ani	12.00	1262	50	Little's	5.00
2674	306	Fissure Knife, Blandin's	8.00	1261	49	Weir's	15.00 to 24.00
2675	306	Fissure Knife, Bodenhammer's.....	5.00		74	Antiseptic Surgery Materials :	
2642	299	Speculum, Bivalve	5.00			Adhesive Plaster, per yard.....	.75
2649	300	Speculum, Bivalve	4.50			Animal Ligature, Dry, per coil	.25
2640	299	Speculum, Gorget Formed	2.00			Cotton, Borated, per pack.....	.25
		See also Rectal Speculum.				Cotton, Dennison's Absorbent, per	
2750	312	Anal Supporter, Mathieu's Prolapsus Ani.	5.00			pack	.30
2749	312	Prolapsus Ani and Pile	8.00			Cotton, Von Brun's, per pack.....	.90
		Analysis, see Urinary Examination Appa-				Gauze, Eucalyptol, per 5 yards	1.25
		ratus.				Gauze, Iodoform, per 5 yards	1.75
1008	3	Analysis, Graduated Tube for.....	1.25			Gauze, Lister's, per 6 yards	.90

FIG.	PAGE.	PRICE.
74	Antiseptic Surgery Materials :	
	Gauze, Thymol, per 5 yards	\$1.25
	Lister's Catgut, American, per bottle ..	.50
	Lister's Catgut, English, per bottle....	.75
	Lister's Silk Protective, per yard.....	
	McIntosh's Cloth, per yard	1.50
	Oiled Silk, per yard	1.50
50	Antiseptic Trocar and Knife, Cousin's ..	4.00
230	Antrum, Abscess of the.	
1536	98 Antrum Drill, Pope's	3.50
313	Anus, Artificial.	
2752	313 Depuytren's Enterotome	5.00
1435	89 Aorta Compressor	5.00
3145	423 Aponeurotome	2.00
2025	187 Apparitor Auris, per pair in Case	6.00
	Applicators, see Aural Applicator, Insuf-	
	flator, Laryngeal Applicator, Larynge-	
	al Powder Blower, Nasal Applicators,	
	Rectal Applicators, Urethral Syringes	
	and Applicators, Uterine Applicator.	
	Arm, Artificial, see Artificial Arm.	
1156	24 Band, Voltaic	2.00
1208	35 Electrode	2.00
1657	116 Junod's Dry Cupping	25.00
3931	591 Sling	4.50
3926	589 Splint, Bancroft's	
3927	589 Splint, Condyle and Humerus ..	.75 to 1.25
3928	589 Splint, Condyle and Humerus,	
	Jointed	1.00 to 1.50
3924	589 Splint, Dressing for Humerus.	
3925	589 Splint, Jointed	2.00 to 2.50
1156	24 Armadillo, Voltaic, for prices see page 24.	
	Armlet, Elastic, Cotton	2.00
	Elastic, Silk	3.00
1035	5 Arnold's Flexible Stethoscope	1.50
3001	376 Arnott's Grooved Probe	1.50
1348	82 Arrow Forceps, Bills'	2.50
	Arterial :	
1479	93 Acupressure Forceps, Allis'	1.75
1480	93 Acupressure Forceps, Allis'	1.75
1473	93 Acupressure Forceps, Allis'	2.00
1474	93 Acupressure Forceps, Allis'	1.75
1475	93 Acupressure Forceps, Allis'	1.75
1478	93 Acupressure Forceps, Milne's	1.50
1469	93 Acupressure Pin	.25
1432	89 Bandage Clamp, Esmarch's	.75
1434	89 Bandage Clamp, Langenbeck's	1.50
1435	89 Arterial Compressor, Aorta	5.00
1427	88 Briddon's	60.00
1428	88 Buck's	35.00
4314	754 Carotid Artery	8.00
1433	89 Erichson's	25.00
1472	93 Gross'	5.00
1426	88 Skey's	24.00
	See also Tourniquet.	
1488	94 Arteriversion Tenaculum, Weber's	1.50
2720	309 Artery and Needle Forceps	2.50
1449	91 Old's	2.25
1470	93 Artery Clamps, Billoth's	8.00
1471	93 Mattock's	.50
	See also Serrefin.	
	Artery Clamp Forceps, Halstead's	2.50
	Koeberle's	2.50
1484	94 Little's	2.25
1481	94 Nott's	6.00
1486	94 Pean's	2.25
1483	94 Sabine's	2.50
1485	94 Tait's	2.50
1486	94 Wood's	2.25
1482	94 Wyeth's	2.50
1468	93 Artery Claw Forceps, Stearn's	8.00
1487	94 Artery Constrictor, Speir's	4.00
1447	91 Artery Forceps, Andrew's	2.50
1459	92 Bigelow's	3.50

FIG.	PAGE.	PRICE.
1443	91 Artery Forceps, Coxeter's	\$1.00
1454	91 Esmarch's Bulbous	2.50
1453	91 Esmarch's Fenestrated	3.00
1455	91 Esmarch's Torsion	2.50
1452	91 Fenestrated Spring Catch	2.00
4022	626 Forcippresure	2.50
4387	766 Hahn's	2.50
1448	91 Hamilton's	2.50
1457	91 Hewson's	8.00
1456	91 Hunter's	2.50
1449	91 Old's	2.25
1451	91 Phelps'	4.50
1445	91 Plain	.75
1442	91 Prince's Tenaculum	6.00
1444	91 Spring-Catch	1.50
1446	91 Torsion	2.50
1450	91 Wheeler's	7.00
1455	92 Wight's	1.75
92	Artery Needles and Ligature Carriers :	
1378	84 Aneurism	1.25
1463	92 Aneurism, Plain	.75
1461	92 Crampton's, pair	5.00
1462	92 Fletcher's Aneurism	3.00
1464	92 Helical, Suture and Ligature	1.75
1467	92 Helmuth's	3.50
1386	84 Little's, Aneurism	1.50
1460	92 Mott's Set of Aneurism	2.75
1466	92 Ostrom's	3.00
	Parker's (Mott's)	3.00
	See also Ligators.	
1403	85 Artery Scissors	1.75
313	Artificial Anus :	
	Bandage	8.00
2752	313 Depuytren's Enterotome	5.00
4307	753 Artificial Arm and Hand	75.00 to 150.00
	Extras for same :	
4309	753 Driving Hook	
4311	753 Fork	
4310	753 Gun Holder	
4308	753 Hand Hook	
4312	753 Pen Holder	
206	Artificial Ear	100.00
4313	754 Eye, Composition	8.00
1990	177 Eye, Glass	10.00
4306	752 Hand, Prince's	60.00
4301	750 Humerus	35.00 to 70.00
2524	276 Larynx, Gussenbauer's-Foulis'	
2523	275 Larynx, Park's	
4392	767 Leech, Flood's, each	1.25
1660	117 Leech, Heurteloup's	8.00
1661	117 Leech, Reese's	4.50
1659	116 Leech, Tiemann & Co.'s	7.00
4302	751 Leg, Bucket	20.00 to 25.00
4304	751 Leg, Thomas', above Knee ..	15.00 to 20.00
4303	751 Leg, Thomas', below Knee ..	15.00 to 20.00
751	Limbs, see Pseudarthrosis.	
730	Artificial Muscles, Attachments for Apply-	
	ing :	
731	Barwell's Rubber, per foot	.12
4242a	731 Barwell's Eyes, each	.10
4242c	731 Barwell's Hooks, each	.10
4242e	731 Barwell's Tin, each	.20
	Moleskin Plaster, per yard	1.50
4243	731 Tins for Sayre's Method, each	.15
2147	208 Artificial Nose	50.00 to 125.00
160	Pupil.	
1887	162 Pupil Knife, Jaeger's	1.75
1888	162 Pupil Knife, Jaeger's	1.50
	See also Ophthalmic : Keratomes.	
2023	187 Tympanum, Toynbee's, Gold Wire ..	.50
2023	187 Tympanum, Toynbee's, Silver Wire ..	.30
	Vesico-Vaginal Fistula, see Kolpo-	
	Cystotomy.	
1348	82 Arrow Extractor, Bill's	2.50

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
	96	Aseptic :			Aural, Diagnostic :
		Amputating Knives, see Amputating.	2004	183	Otoscope, Hassenstein's..... \$5.00
4040	629	Operating Set, Smith's..... \$200.00	2012	184	Otoscope, Park's.....
4041			2011	184	Otoscope, Rumboldt's..... 2.50
4042	630	Operating Set, Tremaine's..... 175.00	2019	185	Otoscope, Siegel's..... 5.00
4043			2000	183	Otoscope, Simrock's..... 4.00
		Aseptic Pocket Set, Bingham's..... 30.00	2009	184	Speculum, Bivalve..... 1.50
		Brigg's..... 32.00	1996	183	Speculum, Gruber's H. R., set of 3... 1.50
	73	Hayward's..... 21.00	2003	183	Speculum, Knapp's, Plated, set of 3... 3.00
		Lilliputian..... 26.00	2003	183	Speculum, Knapp's, Silver, set of 3... 4.50
		Parkinson's..... 40.00	2007	184	Speculum, Kramer's, Plated..... 1.75
	73	Park's..... 28.00	2007	184	Speculum, Kramer's, Steel..... 2.50
		Smith's, Large..... 29.00	2001	183	Speculum, Milikin's..... 1.50
		Smith's, Medium..... 28.00	2010	184	Speculum, Speir's..... 1.50
4038	628	Smith's, Compact..... 18.00	1999	183	Speculum, Speir's, Self-Retaining... 3.00
4039			2002	183	Speculum, Toynbee's, Plated, set of 3 2.50
1276	71	T. & Co.'s Patent "B"..... 28.00	2002	183	Speculum, Toynbee's, Silver, set of 3. 4.50
		T. & Co.'s Patent "P," Small..... 20.00	1998	183	Speculum, Wilde's, H. R., set of 3... 1.50
		U. S. Army..... 28.00	1998	183	Speculum, Wilde's, Plated, set of 3... 2.50
		Walker's..... 30.00	1998	183	Speculum, Wilde's, Silver, set of 3... 4.00
	73	Wright's..... 38.00	2006	184	Speculum, Wilde's Gorgereet..... 1.00
4382	765	Aseptic Saw..... 4.50	2022	186	Tuning Fork, A or C..... 1.50
2636	298	Ashton's Speculum Ani..... 1.00	114		Aural Douches and Syringes :
3175	431	Speculum Vaginae..... 1.00	2076	194	Bag Syringe..... .75
3840	561	Perineum Needle..... 1.00	2080	194	Buck's Nozzle..... .75
2737	811	Pile Clamp..... 3.00	2075	194	Hard Rubber Syringe..... 1.25
	129	Aspiration.	2077	194	Kramer's Syringe..... 4.50
		Aspirator and Hypodermic Syringe..... 5.50	2077	194	Kramer's Syringe, with Stopcock... 5.50
1737	132	and Injector..... 14.00	2074	194	Lucae's Reflux Douche..... 1.50
1732	129	Dieulafoy's, Large..... 50.00	2082	194	Pomeroy's Syringe..... 6.00
1732	129	Dieulafoy's, Small..... 40.00	2079	194	Sexton's Douche.....
1738	133	Emmet's..... 12.00	4393	767	Sexton's Syringe..... 10.00
1741	133	Fitch's..... 5.00	2081	194	Smith's Syringe..... 4.00
1711	126	Flint's..... 5.00	2078	194	Soft Rubber Syringe..... .50
4394	767	Getz's..... 8.50	1192	34	Aural Electrode..... .75
1736	132	Higgins'..... 25.00	190		Aural, Foreign Body and Polypus :
1733	130	Hospital..... 60.00	2044	191	Curette, Buck's..... .75
1740	133	Miller's..... 7.00	2051	191	Curette, Quire's..... 2.25
		Munde's..... 12.00	2068	193	Curette, Sexton's..... 2.00
1734	130	Steurer's..... 35.00	2048	191	Curette, Speir's..... 1.25
1735	131	Tiemann & Co.'s..... 14.00	2066	193	Forceps, Allen's..... 4.50
1735	131	Tiemann & Co.'s Small..... 12.00	2056	192	Forceps, Avery's..... 4.50
		Aspirator Needle, Billroth's..... 5.00	2067	193	Forceps, Bacon's..... 2.50
		Fitch's..... 2.50	2062	192	Forceps, Bumstead's..... 4.00
4035	628	Heuel's..... 1.25	2060	192	Forceps, Hinton's..... 4.00
		Phelps'..... 6.00	2061	192	Forceps, Hinton's, Double Joint... 4.50
1739	133	Warren's..... 3.00	2043	191	Forceps, McKay's..... 2.50
3704	528	Atlee's Clamp..... 6.00	2072	193	Forceps, Noyes'..... 4.50
3586	501	Uterine Dilator..... 2.75	2052	191	Forceps, Politzer's, Cotton-Wool... 1.75
		Atomizer, see Spray Apparatus.	2059	192	Forceps, Politzer's Polypus..... 2.00
	182	Aural, see also Eustachian Canal and Mas-	2055	192	Forceps, Pomeroy's..... 2.50
		toid Process.	2054	191	Forceps, Sexton's Dressing, each... 1.75
		Aural Applicators :	2071	193	Forceps, Sexton's Foreign Body... 4.50
2013	185	Angular Probe..... .75	2058	192	Forceps, T. & Co.'s, and Reflector... 4.50
2091	195	Buck's Cotton Probe..... .50	2057	192	Forceps, T. & Co.'s Foreign Body... 2.25
2014	185	Buck's Silver Probe..... .60	2065	193	Forceps, T. & Co.'s Universal... 5.00
2014b	185	Buck's Silver Probe..... .75	2050	191	Hook, Angular..... 1.50
2093	195	Buck's Port Acid Glass..... .10	2053	191	Hook, Devil's Screw..... 1.75
2090	195	Elastic Caustic Holder..... 2.00	2047	191	Hook, Elsberg's Angular Screw... 2.00
2094	195	Knapp's Powder Blower..... 1.50	2046	191	Hook, Gross', and Spoon..... .75
2092	195	Sexton's Powder Blower..... 3.00	2049	191	Scoop, Fenestrated..... 1.50
2070	193	Vulcanite..... .75	2046	191	Spoon and Hook, Gross'..... .75
	182	Aural, Diagnostic :	2045	191	Spoon, Politzer's Hard Rubber... .75
2021	186	Acoumeter, Politzer's..... 3.50	2064	192	Snare, Blake's..... 3.50
2015	185	Diagnostic Tube, Toynbee's..... .75	2042	190	Snare, Bosworth's..... 4.50
2017	185	Explorer, Toynbee's..... .75	2063	192	Snare, Wilde's..... 3.50
2016	185	Manometer, Politzer's..... .50	196		Aural, Membrana Tympani and Inner Ear :
2018	185	Mirror, Blake's Inner Ear..... 8.00	2107	196	Bistoury, Buck's Probe-pointed... 1.50
1997	183	Mirror, Troeltsch's..... 3.00	2106	196	Bistoury, Buck's Sharp-pointed... 1.50
2008	184	Otoscope, Brunton's..... 6.00	2101	196	Eyelet, Politzer's..... .30
2005	184	Otoscope, Clark's..... 12.00	2101	196	Eyelet Forceps, Politzer's..... 1.50
2020	185	Otoscope, Ely's..... 7.00	2102	196	Furuncle Knife, Buck's..... 1.50
			2099	196	Myringotome, Angular or Straight... 1.00
			2103	196	Myringotome, Buck's..... 1.00

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Aural, Membrana Tympani and Inner Ear :		3529	494	Ball's Stem Pessary	\$1.50
2104	196	Myringotome, Prout's	\$1.00	3576	500	Stem Pessary	1.50
2097	196	Scissors, Gruber's	4.50	3577	500	Stem Pessary	1.50
2098	196	Scissors, Simrock's	4.50	3574	500	Uterine Dilator, Original	10.00
2100	196	Syringe, Blake's	4.50	3575	500	Uterine Dilator, Modified	10.00
2096	196	Tensor Tympani Instrument, Gruber's	2.50	3926	589	Bancroft's Arm Splint	
2095	196	Tensor Tympani Instrument, Weber's	8.00	2808	329	Bandage, Abdominal	6.00
2099	196	Tympanum Perforator, Angular	1.00	1440	90	Esmarch's	3.50
2105	196	Tympanum Perforator, Straight	1.00	1278	74	Martin's. Prices on page 74.	
	187	Aural, Microcoustic, see also Ear Trumpet.		1277	74	Roller, per pound	1.50
	195	Aural Pus Basins and Spouts :		2799	327	Umbilical	6.00 to 8.00
2086	195	Donder's Spout	.75	3877	574	Bandage Knife, Esmarch's	3.00
2087	195	Brass, Nickel-Plated, Large	3.00	3876	574	Bandage Roller	3.00
		Brass, Nickel-Plated, Medium	2.50	3883	575	Bandage Shears, Brun's	10.00
		Brass, Nickel-Plated, Small	2.00	3878	574	Esmarch's	4.50
2088	195	Hard Rubber, Large	3.00	3879	575	Henry's	7.50
		Hard Rubber, Medium	2.50	3884	575	Sayre's	7.00
		Hard Rubber, Small	2.00	3881	575	Szymanowsky's	9.00
2089	195	Hard Rubber, Triangular	3.00	3880	575	Wackerhagen's	6.00
2084	195	Hosner's Spout	.50	3882	575	Wight's	3.50
2083	195	Spout and Hose	1.00		569	Bandaging, Methods of.	
2085	195	Up de Graff's	1.50	2880	346	Bank's Bougies, each	1.25
	202	Aural, Sets of Ear Instruments in Cases :		2971	364	Urethrotome	20.00
	202	Buck's	35.00	1021	5	Barclay's Stethoscope	1.25
	202	Roosa's	43.40	3401	477	Barker's Ointment Bougie	1.25
	202	Poltizer's	22.00	3218	442	Barnes' Speculum Vaginæ	2.50
	202	Sexton's	35.00	2567	282	Spirometer	10.00
2073	193	Sexton's (7 Instruments and Handle)	12.00			Suppositor	2.50
	202	Toynbee's	23.20	3410	473	Tampon Speculum	2.00
	202	Turnbull's	68.00	3605	504	Uterine Dilator	1.00
		Aural Syringe, see Aural Douches and Syringes.				Uterine Dilators, set of 3, with Stop-cocks and Syringe	6.00
1995	182	Aural Trocar	1.50	3667	515	Wire Ecraseur	5.00
	199	Auscultating the Middle Ear.		3625	507	Barrett's Chloride of Silver Battery	
	5	Auscultation, see also Stethoscopes.		3628	508	Current Meter	
1682	121	Auspitz's Dermal Scoop	2.00	3627	508	Electrodes	
2858	344	Urethroscope	20.00	3626	507	Elements	
2193	211	Auto-Insufflator, Bridge's	.75	1042	6	Bartlett's Stethoscope	7.00
1333	80	Automatic Suture, Hoff's	5.50	2828	336	Baruch's Circumcision Scissors	2.50
	17	Autopsic, see also Post Mortem.		4241	730	Barwell's Artificial Muscles, per foot	.12
3650	512	Aveling's Polypotome	8.00	4242	731	Barwell's Attachments: Hooks, each	.10
1662	117	Transfusion Apparatus	4.50			Tin Plate, with Loop, each	.20
	117	Transfusion Apparatus, with Scalpel and Forceps, in Case	8.00	4170		Wire Eyes, each	.10
2056	192	Avery's Ear Forceps	4.50	4171	694	Barwell's Scoliosis Brace	12.00 to 15.00
1014	4	Axilla Thermometer	2.50	4169	694	Sloping Seat	8.00 to 15.00
		Axis-Traction Obstetrical Forceps, Breus'	20.00	4254	734	Talipes Shoe, each	15.00
3778	542	Burge's	30.00	4255	734	Talipes Shoe, Sole of	
3777	542	Corning's	12.00	2991	373	Bates' Urethral Hæmostat	4.00
3779	543	Lusk's	24.00	2969	363	Urethrotome	15.00
		Simpson's	16.00	1828	150	Bath, Eye	.50
3776	542	Tarnier's Original	30.00	2573	283	Hot Air	5.00
		Tarnier's Improved (1887)	30.00		122	Bath, Mercurial Fumigation :	
	179	Ayres' Set of Eye Instruments, Large	84.65	1695	122	Bumstead-Lee Lamp	3.00
	179	Set of Eye Instruments, Small	49.25	1696	122	Maury's Apparatus	12.00
				1694	122	Van Buren's Apparatus	2.50
1903	162	Baader's Linear Knife, Left	1.75	1246	42	Bath, Warm Water, for Arm	15.00
1902	162	Linear Knife, Right	1.75	1247	42	Warm Water, for Lower Extremity	15.00
3455	487	Babcock's Pessary, with Belt	15.00	1011b	3	Water, Urinary Examination	2.50
2442	259	Baber's Pocket Laryngoscope	7.50	3184	433	Bath Speculum	3.00
3793	543	Bachelor's Embryotomy Forceps	12.00	1155	24	Battery, Faradic: Gaiffe's	10.00
3796	549	Perforator	5.00	1155	24	Gaiffe's, Nickel-plated	12.00
2067	193	Bacon's Curette Ear Forceps	2.50			Gaiffe's, Extra Trough	2.00
3972	605	Patella Support	18.00			Gaiffe's, Extra Zinc	.25
3037	387	Bag and Stop-cock for Catheters	3.00	1164	29	McIntosh's Family	10.00
2076	194	Bag Ear Syringe	.75	1161	27	McIntosh's Physicians'	18.00
2078	194	Bag Ear Syringe	.50	1163	28	McIntosh's Physicians', No. 3	30.00
3706	528	Baker Brown's Clamp	12.00	3625	507	Battery, Galvanic: Barrett's	
3853	566	Ball, Antiseptic.		1157	25	McIntosh's, 18 Cell	40.00
2777	322	Ball and Socket Truss, Self-adjusting	3.00 to 5.00	1159	26	McIntosh's, 24 Cell	55.00
1210	35	Ball Electrode	.75	1153	23	Stoehrer's, 8 Cell	20.00
1985	175	Ball's Double Hook	3.00			Stoehrer's, 16 Cell	30.00
3185	435	Speculum Vaginæ	11.00			Stoehrer's, 32 Cell	55.00
						Battery, Galvanic and Faradic Combined :	
				1162	27	McIntosh's, 12 Cell	40.00

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
1970	173	Blanchet's Cataract Exhauster.....			See Rectal Bougie.
1552	100	Blandin's Bone Staff.....			See Urethral Stricture Dilators.
2674	306	Fistula Knife.....			See Urethral Stricture, Exploring.
		Bleeding, see Phlebotomy.	718		Bow-Leg, see also Genu Varum.
4402	769	Blitz's Canalicula Dilator.....	3494	491	Bow Pessary, Fowler's.....
1984	175	Extirpation Forceps.....	1604	104	Saw, Butcher's.....
3121	417	Blizard's Lithotomy Knife (Am. Pattern)...	1529	97	Saw, Tiemann & Co.'s.....
3120	417	Lithotomy Knife (English Pattern)...	2801	328	Spring Abdominal Supporter...
117		Blood, Transfusion of, see also Transfusion Apparatus.	2778	323	Spring Truss.....
90		Bloodless Operation, Esmarch's Method.	2795	327	Spring Umbilical Truss.....
1440	90	Esmarch's Tourniquet.....	2798	327	Spring Umbilical Truss, Child's
		Blood-letting, see Phlebotomy.	4231	720	Bowed Tibia, Brace for.....
3804	550	Blot's Perforator.....	1808	148	Bowman's Canalicula Knife.....
1106	15	Blow-Pipe, Post Mortem.....	1972	173	Cataract Exhauster.....
1144	19	Physiological Experiment.....	1807	148	Director.....
1240	39	Self-Acting, for Heating.....	1856	152	Eye Speculum.....
1239	39	Wight's.....	1955	168	Lens Spoon, Concave.....
3134	421	Blunt Gorget, Lithotomy.....	1953	168	Lens Spoon, Flat.....
3135	421	Keyes' Lithotomy.....	1787	147	Probes, Silver, per set.....
4375	765	Blunt Hook, Large (Retractor).....	1787	147	Probes, Silver, each.....
4376	765	Small (Retractor).....	1978	174	Stop Needle.....
1138	19	Physiological Experiment.....	3284	452	Bozeman's Angular Scalpel.....
2342	284	Staphylorhaphy.....	3611	505	Angular Scissors.....
2806	550	Taylor's Obstetrical.....	3324	457	Button, per dozen.....
2539	277	Tracheotomy.....	3329	457	Button Adjuster.....
3805	550	Blunt Hook and Crotchet.....	3323	457	Button Shaper.....
3808	550	Bedford's.....		457	Button Suture.....
3807	550	Guarded.....	3318	456	Blunt Hook.....
2677	306	Blunt-pointed Bistoury, Rectal.....	3244	447	Columning Specula, set of 3.....
1879	154	Strabismus Scissors, Curved.....	3318	456	Counter-Pressure Hook.....
1374	84	Tenotome.....	3644	511	Curette.....
2675	306	Bodenhamer's Anal Fissure Knife.....	3286	452	Curved Scissors.....
2676	306	Bistoury Caché.....	4405	769	Delicate Knife.....
2674	306	Blandin's Knife.....	3247	448	Depressor.....
2724	310	Curvilinear Forceps.....	3248	448	Depressor, Double Hooked.....
2656	301	Rectal Exploring Sounds, 10 sizes, ea.	3253	448	Depressor, Urethral and Perineal.....
2673	305	Rectal Irrigator.....	3285	452	Double Curved Scissors.....
2651	300	Recto-Colonic Endoscope.....	3384	475	Dressing Forceps.....
2634	298	Reflector and Lens.....	3214	442	Duck-Bill Speculum.....
2727	310	Spring Ligating Forceps.....	3423	482	Intra-Uterine Back Flow Tube.....
3970	604	Boisnot's Patella Splint.....	4352	760	Intra-Vaginal Drainage Dilator.....
2747	312	Bolton's Pile Bougie.....	3294	452	Knife.....
2134	199	Bonafont's Eustachian Catheter Holder.....	3322	457	Needle, per dozen.....
2150	205	Nasal Speculum.....	3322	457	Needle Holder.....
108		Bone Drill, see Osteotomy Drill.	1264	51	Operating Chair.....
106		Exsecting Set.....	3253	448	Perineal Depressor.....
		Forceps, see Forceps, Bone Cutting.	3327	457	Perineal Elevator.....
1133	18	Forceps, Physiological.....	3519	493	Pessary, Smith's Modified.....
1132	18	Forceps, Spinal Canal.....	4373	764	Renal Sound.....
102		Gouges, see Osteotomy: Gouges.	3284	452	Scalpel, Angular.....
103		Gouging Forceps, see Osteotomy: Forceps and Rongeurs.	3283	452	Scalpel, Straight.....
101		Holding Forceps, see Osteophor.	3611	505	Scissors, Angular.....
99		Bones, Skeleton, see Osteological: Human Skeleton.	3286	452	Scissors, Curved.....
1156	116	Boot, Junod's.....	3285	452	Scissors, Double Curved.....
		Borated Cotton, per pack.....	3519	493	Smith's Pessary.....
3694	525	Borck's Cyst Elevator.....	3226	443	Speculum Vaginæ.....
2189	211	Bosworth's Applicator.....	3263	449	Tenaculum.....
		Electrodes in Case.....	3266	449	Tenaculum, Long.....
2207	215	Jarvis' Snare (Ecraseur).....	3253	448	Urethral and Perineal Depressor.....
2218	217	Nasal Clamp.....	4350	760	Utero-Vesical Drainage Support.....
4320	755	Nasal Saws, each.....	4353	760	Utero-Vesico-Urethral Drainage Support.....
2160	206	Nasal Speculum.....			port.....
2042	190	Polypus Snare.....	3241	446	Vaginal Dilator.....
		Polypus Snare, with Curved and Straight Ends.....	3242	446	Vaginal Dilator.....
2217	217	Rhinoplastos.....	3441	486	Vaginal Dilator.....
2381	238	Tongue Depressor.....	3459	488	Vaginal Support.....
125		Bottle, Patent, for Hypodermic Syringe...	462		Vesico-Vaginal Fistula, Set of Instruments.....
2148	204	Bougie, Nasal, Yearsley's.....	4351	760	Vulvo-Vaginal Drainage Dilator.....
		See Esophageal Stricture Dilators.	3328	457	Wire Adjuster.....
		See Pile Bougie.	1531	98	Brace and Guarded Crown.....
			1531	98	Brace for Trephines.....
			1989	176	Bradford's Electro-Magnet.....
			1994	178	Eye Speculum.....

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
4261	737	Bradford's Tarso Corrector			
1966	172	Twin Cataract Needle	3910	582	Buck's Extension Apparatus, continued:
1625	109	Brainard's Bone Drills, Set of 5			Splints, Coaptation.
1110	15	Brain Knife	3909	582	Wooden Upright and Sandbag.
		Braun's Abdominal Supporter	3911	583	Extension Fulcrum
					Extension Fulcrum and Weights
3820	552	Cephalotribe	2102	196	Furuncle Knife
3784	547	Colpeurynter		56	General Operating Set
3810	550	Decapitating Hook	2108	197	Mastoid Process Knife
3781	545	Obstetrical Forceps, Triform	2103	196	Myringotome
		Simpson's Obstetrical Forceps	1417	86	Needle (and Post's) for Pocket
3411	478	Tampon Expeller	2080	194	Nozzle, Ear
3812	550	Trephine Perforator	2110	197	Periosteotome
3400	477	Uterine Syringe	1318	79	Pin Conductor, Slide Catch
3670	515	Braxton-Hick's Ecraseur	2316	231	Pin Conductor, Slide Catch
3671	515	Ecraseur, Modified			Pin Conductor (Plain)
		Breus' Obstetrical Forceps	2093	195	Port Acid Glass
3190	435	Brewer's Speculum Vaginae	2014	185	Probe, Silver
1790	147	Brewster's Lachrymal Cupped Sound	2014b	185	Probe, Silver
3736	536	Brickell's Obstetrical Forceps	1730	128	Rectum Trocar
3847	562	Perineal Stay		202	Set of Ear Instruments
	553	Set of Obstetrical Instruments	2461	264	Sponge Holder
1427	88	Briddon's Artery Compressor	3885	577	Suspension Apparatus
2193	211	Bridge's Auto-Insufflator	2510	270	Throat Forceps
2192	211	Nasal Douche	2391	242	Throat Lancet
3130	419	Brigg's Lithotome	2533	277	Tracheotomy Guide
2613	292	Bristle Probang	3753	538	Budd's Obstetrical Forceps
2614	292	Stanford's		553	Set of Obstetrical Instruments
2543	278	Bronchotome, Pilcher's	1444	91	Bull-Dog Artery Forceps, Spring Catch
		Bronchotomy, see Tracheotomy.	1134	18	Forceps for Gastric Fistula
3168	428	Brown's Air Tampon	1987	175	Forceps for Extirpation of Eye
3706	528	Clamp, Ovariectomy		82	Bullet Extracting.
1708	125	Hypodermic Syringe	1364	83	Extractor, Mose's
3489	490	Pessary	1365	83	Bullet Forceps, American, Tiemann & Co.'s
	69	Pocket Set	1357	83	Flexible, Tiemann & Co.'s
2562	281	Spirometer	1361	83	Gross'
2908	350	Syringe and Applicator	1360	83	Hamilton's
2989	371	Urethrametome	1356	83	Thomasin's
4230	720	Bruce's Bow-Leg Apparatus, per pair	1365	83	Tiemann & Co.'s
			1363	83	U. S. Army
			1358	83	Weisse's
3883	575	Brun's Bandage Shears	1351	82	Bullet Probe, Eldridge's
2499	269	Epiglottis Pincette	4372	764	Fuhrer's Aluminium
2008	184	Brunton's Otoscope	1353	82	Hamilton's, per set
1196	84	Brush Electrode	1354	82	Long, Silver, each
1211	35	Electrode	1350	82	Nelaton's
1216	35	Electrode	1352	82	Sayre's
2459	264	Brush Holder, Child's	1355	82	Tiemann & Co.'s and Lint Carrier
2467	264	Leffert's	1359	83	Bullet Scoop
2458	264	Mackenzie's	1362	83	Screw
2463	264	Noyes'	1349	82	Seeker
2697	307	Rectal	2062	192	Bumstead's Canulated Forceps
2466	264	Ruppaner's	2943	358	Holt's Divulsor
2462	264	Seeger's	1695	122	Lee's Lamp
2465	264	Wagner's, with one dozen Brushes	2954	360	Maisonneuve's Urethrotome
2917	351	Bryce's Urethral Applicator	2906	350	P. P. Syringe
3122	417	Buchanan's Rectangular Staff	2900	349	Retention Catheter
4321	755	Bucklin's Nasal Saws, per set	2850	342	Sound Curve, F, B, E.
1428	88	Buck's Arterial Compressor	2910	350	Urethral Syringe
2107	196	Bistoury, Probe-Pointed	2967	363	Urethrotome
2106	196	Bistoury, Sharp-Pointed	4283	745	Union Apparatus, Bigg's
1610	106	Chain Saw Conductor	1011e	3	Bunsen Burner
2112	197	Chisel, Mastoid			Burdick's Obstetrical Forceps
2113	197	Chisel, Mastoid	1010a	3	Burette, Mohr's
2091	105	Cotton Probe	2587	285	Burge's Air Compressor, Double Acting
2014	185	Cotton Probe, Silver	3943	594	Fracture Apparatus
2014b	185	Cotton Probe, Silver	3778	542	Obstetrical Forceps
2044	191	Curette, Ear	2932	354	Stricture Dilator, Curved
2201	213	Curette, Nasal and Ear	2933	354	Stricture Dilator, Straight
1619	108	Drills, Mastoid	2508	270	Throat Forceps
1630	109	Drill, Mastoid	1623	108	Burnett's Mastoid Knife
2127	197	Drill, Mastoid	2109	197	Mastoid Knife
3906	582	Extension Apparatus, Complete	2600	288	Burrall's Atomizer
		Consisting of:	1027	5	Burrows' Stethoscope
3907	582	Adhesive Plaster and Webbing.	3133	421	Bush's Gorget
3908	582	Perineal Band.			

FIG.	PAGE.		PRICE.
2713	309	Bush's Pile Needles and Holder	\$3.00
2709	308	Pile Scissors	1.50
1604	104	Butcher's Saw	16.00
1172	32	Butler's Electro-Massage Instrument	
2902	350	Buttles' Gonorrhœa Syringe	5.00
2144	201	Inhaler	2.00
3510	492	Pessary	.50
3511	492	Pessary	.50
3623	506	Scarificator	1.25
3614	506	Scarificator and Tenaculum	2.50
3352	471	Set of Uterine Instruments	23.00
3761	539	Buzzle's Obstetrical Forceps	10.00
3718	530	Byford's Clamps, per set	18.00
		Pelvimeter	8.00
3977	608	Byrd's Wire Gauze and Smith's Splint	5.00
2711	308	Byrne's Double Spring Tenaculum	6.00
3419	492	Reflux Catheter and Adjuster	2.50
3208	441	Speculum Vaginæ	11.00
3556	497	Tenaculum Forceps	6.00
3555	497	Uterine Fixator	2.50
3655	513	Vulsellum Forceps	3.00
3656	513	Vulsellum Forceps	3.00
4274	741	Calcaneus Apparatus, each	10.00 to 12.00
4273	741	Shoe, each	10.00 to 12.00
	398	Calculus, Urethral, see also Urethral: Foreign Body Extractors.	
	400	Calculus, Vesical, see also Stone in the Bladder.	
	58	California General Operating Set	69.30
2464	264	Sponge or Brush Holder	2.00
1287	75	Callender's Drainage Canula	3.00
1125	16	Calvarian Clamp, Satterthwaite's	5.50
1120	16	Hook	1.50
1038	6	Cammann's Auscultator, Cylindrical	1.25
1037	6	Auscultator, Intra-Costal	1.50
1058	8	Cardiometer	4.50
1036	6	Stethoscope	4.50
3167	428	Campbell's Canula and Cotton Introducer	
3566	498	Intra-Uterine Stem, per set	4.50
3482	490	Pessary, Soft Rubber	.75
3460	498	Pneumatic Uterine Repositor	.25
3661	513	Tumor Forceps	8.00
		Canalicula, see Ophthalmic, Lachrymal.	
2038	188	Cane Ear Trumpet	
1883	157	Canthoplasty Needle, Prince's	2.50
3170	429	Canula, à Chemise	1.50
2196	212	Epistaxis, Belocq's, Silver	3.00
2731	310	Gooche's	6.00
1792	147	Lachrymal Canula, 50c.; Style	.75
3664	514	Levret's	6.00
2203	213	Nasal Polypus	1.50
		Trachea, see Trachea Canula.	
2209	215	Canula Scissors, Smith's	5.00
	63	Capital Operating Set	52.00
	64	Conant's	53.95
	62	U. S. Army	102.50
	62	U. S. Army, Staff Surgeon's	137.10
1528	97	Capital Saw, Parker's	5.00
1527	97	Satterlee's	5.00
1526	97	Tiemann & Co.'s	5.00
1965	172	Capsulotome, Knapp's	1.75
	168	Capsulotomy.	
4357	761	Carbon-Dioxide Generator	10.00
4358			
1058	8	Cardiometer, Cammann's	4.50
	8	Cardiometric.	
	631	Care of the Insane, see also Restraints.	
3790	548	Carey's Lever, Placenta	1.00
	678	Caries of Spine, see also Spinal Braces.	
1756	144	Carmalt's Perimeter	
4403	769	Punch, Transplantation	6.00
2194	212	Caro's Nasal Clamp	.75

FIG.	PAGE.		PRICE.
		Caro's Urethral Speculum	\$2.50
4314	754	Carotid Artery Compressor, Corning's	8.00
1065	10	Carroll's Æsthesiometer	4.00
2721	309	Knot Tier	2.00
2823	383	Orchitis Compressor	1.25
3523	493	Retroflexion Pessary	.75
1063	9	Stethometer	3.00
3437	485	Uterine Repositor	3.50
1668	120	Vaccinator	.25
1835	150	Carron de Villard's Eye Needle	1.25
1858	152	Fixation Forceps	3.00
1771	145	Lid Forceps	4.00
1136	19	Cartilage Knife	1.50
1491	95	Knife	1.50
1492	95	Knife	2.00
1103	15	Knife, Steel Handle	.60
2918	351	Caspar's Ointment Bougie	2.00
		Cataract, see Ophthalmic, Cataract.	
2183	210	Catarrhal Douche, Warner's	1.00
		See Nasal Douche.	
		Catgut, see Ligature.	
1300	77	Catheter, Compound, Parker's	4.50
1305	77	Compound, Plated	1.50
1305	77	Compound, Silver	2.50
3036	387	Cowan's, Vertebrated	8.50
		Catheter, Double Current:	
		Gum Elastic, English	2.50
		Hard Rubber	4.00
3044	389	Marcy's	2.50
3421	482	Nott's	3.00
3422	482	Nott's	2.50
3046	389	Nott's	3.00
3420	482	Reliquet's	3.50
3045	389	Silver	5.00
3044	389	Soft Rubber, Velvet-eyed	2.50
		Catheter, English Gum Elastic:	
		Double Current	2.50
		Double Web, Best	.25
		Mercier's Curve	1.00
		Olive-pointed, Black	.50
		Olive-pointed, Red	.50
		Open-end	.75
		Prostatic	.75
3027	385	Silk Web	1.00
3028	385	Silk Web (Bougie)	1.00
3029	385	Silk Web	1.00
		Catheter, Eustachian, see Eustachian Catheter.	
		Catheter, French Gum Elastic:	
		Conical	.50
3026	385	Curved	.75
		Curved, Olive-pointed	1.00
		Cylindrical	.25
3029	385	Mercier's Double Elbowed	1.00
3025	385	Mercier's Elbowed	1.00
3022	385	Olivary	.50
3023	385	Olivary	.50
3021	385	Prostatic	1.00
2895	348	Catheter, Gouley's Tunnelled	2.50
3041	387	Gross' Flexible	2.00
		Hard Rubber	1.00
		Hard Rubber, Double Current	4.00
3047	300	Harrison's Pessary Catheter	4.00
3020	385	Hutchinson's Prostatic	5.00
3040	387	Huter's, Flat	2.00
3019	384	Male and Female, Plated	1.50
3019	384	Male and Female, Silver	2.50
3025	385	Mercier's Double Elbowed	1.00
3024	385	Mercier's Elbowed	1.00
3042	388	Mercier's, Invaginated	3.50
		Catheter, Nickel-plated: Female	.50
		Male	1.00
3019	384	Male and Female	1.50
3018	384	Parker's	2.50

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Catheter, Nickel-plated: Prostatic	\$1.50	1301			
3018	384	Catheter, Parker's, Compound, Plated	2.50	1302	77	Caustic Holder, Dugas'	\$5.00
3018	384	Parker's, Compound, Silver	4.50	2090	195	Elastic, Ear	2.00
		Catheter, Prostatic:		1308	77	Hard Rubber and Silver	1.00
3021	385	French Gum Elastic	1.00	2482	266	Jarvis' Applicator, Laryngeal	10.00
3020	385	Hutchinson's	5.00	2481	266	Lente's Probe	1.25
		Plated	1.50	2479	266	Lente's Cup	3.50
3031	386	Soft Rubber, Velvet-eyed	1.00	1300	77	Caustic Holder and Catheter, Parker's	
		Silver	2.25 to 4.00			Plated	2.50
		Catheter, Retention:		1300	77	Parker's Silver	4.50
2895	348	Gouley's	2.50	1304	77	Caustic Holder and Curette	2.50
2899	349	Otis'	3.00	2481	266	Caustic Probe, Lente's	1.25
2897	348	Thompson's	3.00	2920	351	Caustic Syringe, Bigelow's	6.00
2900	349	Thompson's-Bumstead's	3.50	2908	350	Brown's	24.00
		Teevan's	2.50	2914	351	Dick's	3.50
		Catheter, Silver:				Cautery, see Actual Cautery, Galvano-Cau-	
		Double Current	5.00 to 7.00			tery, Thermo-Cautery.	
		Female	1.00	1032	5	Cedar Stethoscope, Hard Rubber Ear-Piece	1.50
		Male, according to size	1.50 to 4.00	1028	5	Short	.75
3019	384	Male and Female	2.50	1039	6	Vulcanite Ear-Piece	1.50
3018	384	Parker's, Combined	4.50	3820	552	Cephalotribe, Braun's	18.00
		Parker's Female and Caustic Case	3.00			Hicks'	24.00
		Prostatic	2.25 to 4.00	3822	552	Lusk's	18.00
3279	451	Catheter, Sims' Sigmoid, Hard Rubber	1.00	3821	552	Simpson's	15.00
3279	451	Sims' Sigmoid, Silver	1.50	3818	551	Van Huvel's	
3279	451	Sims' Sigmoid, Tin	.75		162	Ceratomy, see also Ophthalmic: Keratome.	
3341	466	Skene's, Double Perforated	2.00	1884	159	Chadwick's Pterygium Scissors	6.00
3340	466	Skene's, Self-retaining	1.00	1126	16	Chain Hook	.25
		Soft Rubber, see Catheter: Vulcan-		1114	16	Darling's	.50
		ized India Rubber.		1609	106	Chain Saw	10.00
3035	387	Squire's Vertebated	6.00	1612	106	Chain Saw Carrier	2.00
2897	348	Thompson's Retention	3.00	1610	106	Buck's	3.00
1306	77	Tiemann's Flexible Joint	4.00	1611	106	Post's	4.00
3036	387	Vertebated, Cowan's	8.50	1613	106	Prince's	3.50
3035	387	Vertebated, Squire's	6.00	3541	495	Chambers' Stem Pessary, per set	3.00
		Catheter, Vulcanized India Rubber (Soft		3478	490	Chamberlain's Pessary	1.50
		Rubber):		3479	490	Pessary	1.50
		Jaques'	1.00			Uterine Tube, Glass	1.00
		Nelaton's	.50	2589	286	Chapin's Spray for Trypsin in Croup	4.50
3031a	386	Tiemann's Velvet-eyed	.75	2181	210	Chapman's Nasal Spray	5.00
3031b	386	Tiemann's Velvet-eyed	.75	3357	473	Probe and Sounds	4.00
3031c	386	Tiemann's Velvet-eyed	1.00	3615	506	Uterine Scarificator	1.50
3031d	386	Tiemann's Velvet-eyed	1.50	3621	506	Uterine Scarificator, Pocket	2.50
3031e	386	Tiemann's Velvet-eyed	.75	4211	712	Charcot and Cazenave's Apparatus for	
3031f	386	Tiemann's Velvet-eyed	1.00			Writer's Cramp	
3031g	386	Tiemann's Velvet-eyed	1.00	3991	614	Charrière's Luxation Forceps	9.00
3031h	386	Tiemann's Velvet-eyed	.75	1090	13	Microscopic Section Knife	8.00
3031i	386	Tiemann's Velvet-eyed	.75	2965	363	Stricture Cutter	14.00
3044	389	Tiemann's Velvet-eyed, Double Cur-		1431	88	Tourniquet	2.50
		rent	2.50	4213	713	Writer's Cramp Apparatus	
3038	387	Catheter, Warren's Door	6.00	1284	75	Chassaignac's Drainage Trocar	4.00
3039	387	Warren's Vermicular	3.00	3663	514	Ecraseur	25.00
		Catheter Electrode, Newman's	4.00	2548	278	Tracheal Dilator	3.00
1176	32	Nunn's	4.00	2784	324	Chase's Truss	4.00
1202	34	Metallic, Silver	2.50	2794	327	Umbilical Truss	4.00
1203	34	Metallic, Silver	2.50	1252	45	Cheatham's Ether Inhaler	3.50
3032	386	Catheter Guide, Keyes'	.75	2362	236	Cheek Retractor, Jointed	3.00
3033	386	Otis'	1.25	2353	236	Langenbeck's	2.50
3034	386	Catheter Holder	.50	2365	236	Left	1.00
2920	351	Catheter Syringe, Bigelow's	6.00	2364	236	Luer's	2.00
2914	351	Dick's	3.50	2363	236	Right	1.00
2898	348	Otis'	4.50	2366	236	Roe's	2.50
		Catling, Long	4.50	2459	264	Child's Brush and Caustic Holder	2.50
		Medium	3.50	2797	327	Children's Umbilical Truss	2.50 to 3.00
1495	95	Small	2.50	2798	327	Umbilical Truss	2.50 to 3.00
		Catling, Aseptic, Hard Rubber Handle:				Chinese Bead Silk, Black and White, Skein	.20
1505	96	Long	5.00	2112	197	Chisel, Buck's	1.25
1506	96	Medium	4.00	2113	197	Buck's	1.25
		Small	3.00	1577	102	Darby's, and Gouges, per set	7.00
		Caustic Case, Aluminum	2.25	1119	16	Dissecting	.75
1308	77	Hard Rubber and Silver	1.00	4383	766	Gerster's	
1299	77	Silver	1.50	1578	102	Linhardt's	1.50
1303	77	Caustic Holder, Child's	2.50	1639	112	Macewen's	6.00
2480	266	Concealed, Laryngeal	2.50	1575	102	Osteotomy	1.25

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
2118	197	Chisel, Schwartz's.....	\$1.25				
2119	197	Schwartz's.....	1.25	1014	4	Clinical Thermometers:	
2120	197	Schwartz's.....	1.25			Axilla, Ivory Scale.....	\$2.50
2121	197	Schwartz's.....	1.25	1013	4	Constricted Stem.....	1.50
2122	197	Schwartz's.....	1.25			Dunster's, in Silver Case.....	4.50
3110	412	Chismore's Evacuating Lithotrite.....	24.00			Hicks' Indestructible Index.....	2.00
1251	44	Chisolm's Ether Inhaler.....	2.50	1019	4	Hicks' Lens Front.....	3.50
		Chloroform Inhaler, see Anæsthetic In-				Hicks' Minute.....	5.00
		haler.....		1012	4	Self-registering, Straight.....	1.50
2388	239	Church's Tongue Depressor.....	6.50	1013	4	Self-registering, Straight.....	1.50
1773	146	Cilia Forceps.....	1.00	1016	4	Surface, Fahrenheit.....	2.00
		See also Epilating Forceps.....		1017	4	Surface, Seguin's.....	2.00
3666	515	Cintrat's Ligator.....	2.50	1015	4	Tiemann's Bent.....	3.50
3682	519	Needle.....	1.75			Tiemann's Bent, with Lens Front.....	4.00
3683	519	Serre-Neud.....	10.00	1018	4	Twisted Stem.....	2.00
1618	108	Circular Saw, Graefe's.....	20.00	2580	284	Clinton's Atomizer.....	1.75
4232	733	Roberts', Electro.....		3112	415	Clover's Crutch (Peter's).....	15.00
1617	107	Tiemann & Co's.....	12.00	3093	405	Evacuating Apparatus.....	14.00
2826	335	Circumcision Ring, Ross'.....	1.00	2374	237	Mouth Gag.....	3.50
2828	336	Scissors, Baruch's.....	2.50		725	Club-foot, see also Orthopædic: Deformi-	
2887	347	Civiale's Bistoury Caché.....	5.00			ties of the Feet.....	
3083	403	Lithotriptor.....	25.00	3910	582	Coaptation Splints.....	
2964	363	Urethrotome.....	12.00	4336	758	Cocaine Pipette, Prince's.....	.75
2310	231	Clamp, Harelip, Hutchison's.....	3.00	3049	392	Cock's Trocar.....	15.00
2313	231	Harelip, Prince's.....	3.00	4325	756	Cohen's Antero-Posterior-Pharyngeal For-	
2314	231	Harelip, Smith's.....	6.00			ceps.....	4.50
2312	231	Harelip, Whitson's.....	3.00	4328	756	Combination Snare.....	
2194	212	Nasal, Caro's.....	.75	4331	756	Larynx Curette, each.....	2.50
		Ovarian, see Ovariectomy: Pedicle		4327	756	Laryngeal Stenosis Dilator.....	10.00
		Clamps.....		4330	756	Powder Blower.....	2.00
		Pile, Allingham's.....	12.00			Tongue Depressor.....	1.50
2740	311	Pile, Amussat's.....	8.00	4324	756	Trachea Tube.....	8.00
2737	311	Pile, Ashton's.....	3.00	4329	756	Sponge Forceps, three sizes, each.....	4.00
2733	311	Pile, Kelsey's.....	6.50	4326	756	Wire Snare (Bosworth's).....	4.00
2734	311	Pile, Smith's.....	6.50	2837	337	Cohn's Phimosis Forceps.....	9.00
2735	311	Pile, Tiemann & Co's.....	6.00	2751	312	Coil, Cooling, Abdominal.....	8.00
2819	332	Scrotal, Henry's.....	8.00	3851	565	Cooling, Esmarch's.....	6.00
2816	332	Scrotal, Lewis'.....	4.00			Cooling, Head.....	8.00
2817	332	Scrotal, Williams'.....	4.00		40	Cold and Heat, Application of.....	
2818	332	Scrotal, Williams'.....	.75	2925	332	Cold Sound (Psychrophor), Silver.....	4.00
4406	770	Vaginal, Noeggerath's.....	7.00	3522	493	Cole's Anteversion Pessary.....	3.00
4400	769	Vaginal, Thomas'.....	6.00	3530	494	Galvanic Pessary.....	2.00
3962	601	Clark's Fracture Splint.....	30.00	3743	537	Obstetrical Forceps.....	8.00
2176	209	Nasal Douche.....	1.50	3521	493	Retroversion Pessary.....	3.00
3930	590	Olecranon Splint.....	5.00 to 8.00	3486			
2005	184	Otoscope.....	12.00	3487	400	Coleman's Pessary.....	.40
1271	55	Physician's Office Chair.....			591	Colles' Fracture Apparatus:	
1030	5	Stethoscope.....	1.25			Coover's Splint.....	1.50
3679	516	Tooth-edged Scissors.....	9.00	3932	591	Hewitt's Splint.....	7.00
	610	Clavicle, Dislocated:		3940	592	Shrady's Splint.....	2.00
3983	611	Cooper's Apparatus.....	5.00	3939	592	Smith's Splint.....	
3985	612	Mayor's Apparatus.....	5.00	3933	591	Stillman's Splint.....	
3981	610	Pulleys, Brass, per pair.....	7.00	2447	261	Collin's Lamp.....	7.00
3984	612	Smith's Apparatus.....		3064	399	Foreign Body Instrument.....	30.00
	587	Clavicle, Fractured:		2157	205	Nasal Speculum.....	3.50
3921	587	Fox's Splint.....	5.00			Pelvimeter.....	8.00
3920	587	Levis' Splint.....	5.00	2653	301	Colonic Exploring Sound.....	8.00
3922	588	Richardson's Splint.....	6.00	3784	547	Colpeurynter, Braun's.....	3.00
3923	588	Sayre's Dressing.....		3147	423	Guyon's-Peterson's.....	1.50
2478	266	Clay's Powder Insufflator.....	2.00	3147	423	Guyon's, with Stopcock.....	2.00
	209	Cleansing and Medicating the Nasal Pas-		1195	34	Comb Electrode.....	1.50
		sages, see also Nasal Douches.....		2796	327	Combination Supporter, Walker's.....	12.00
	194	Cleansing the Ear, see also Aural: Douches		1674	120	Comedone Extractor, Piffard's.....	.75
		and Syringes.....		1675	120	Comedone Extractor and Acne Lancet.....	2.50
	564	Cleansing of Wounds, see also Wounds and			63	Compact Amputating Set.....	33.50
		Injuries.....			61	Field Set, Otis' U. S. A.....	160.00
4408	770	Cleborne's Artery and Tissue Forceps.....	3.50		179	Set of Eye Instruments.....	28.00
1325	80	Pocket Instrument.....	7.00	1305	77	Compound Catheter, Plated.....	1.50
2595	287	Tongue Depressor and Insufflator.....	8.00	1305	77	Catheter, Silver.....	2.50
2594	287	Tongue Spatula and Atomizer.....		1300	77	Catheter, Parker's, Plated.....	2.50
2670	305	Clendinen's Rectal Irrigator.....	6.00	1300	77	Catheter, Parker's, Silver.....	4.50
3979	609	Suspending Splint.....				Compressor, Arterial, see Arterial Com-	
2407	245	Tonsil Hemostatic.....	2.25			pressor.....	
3601	504	Climax Uterine Dilator.....	15.00	2823	333	Scrotal, Carroll's, Orchitis.....	1.25
				2821	333	Scrotal, Hawes', Orchitis.....	3.00

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
2811	331	Compressor, Scrotal, Miliano's, Varicocele	\$2.00	3828	557	Counter-Pressor, Skene's	\$1.50
2822	333	Scrotal, White's	3.00	3319	456	Counter-Pressure Fork, Nilsen's	1.75
2814	331	Seminal Cords, Doisneau's	4.00	3318	456	Hook, Bozeman's	1.50
1267	53	Comstock's Gynæpod	20.00	3317	456	Hook, Emmet's	1.25
1267	53	Gynæpod, with Speculum	25.00	3336	464	Staff, Harris'	2.00
3742	587	Obstetrical Forceps	8.00	3320	456	Tenaculum, Hanks'	2.00
1501	95	Conant's Knives and Saw	10.00	3829	557	Cowan's Trachelorrhaphy Forceps	4.00
	64	Operating Set	53.95	3607	504	Uterine Dilator, set of 3	2.50
3528	494	Stem Pessary	3.00	3036	387	Vertebrate Catheter	8.50
1372	84	Concave-edged Tenotome	1.25	1608	105	Cowgill's-Hey's Saw	3.50
3927	589	Condyle and Humerus Splint	.75 to 1.25			Cowhorn Tooth Forceps:	
3928	589	Jointed	1.00 to 1.50	2252	223	Lower Molar, Left	2.00
		Congester, Penis	5.00	2251	223	Lower Molar, Right	2.00
4205	710	Contracted Wrist Apparatus	20.00 to 30.00	2253	224	Molar, Either Side	2.00
2036	188	Conversation Tube, Mohair, Cylindrical	2.50	2242	222	Upper Molar, Either Side	2.00
		Mohair, Conical	4.00	2241	222	Upper Molar, Left	2.00
		Silk, Cylindrical	4.00	2240	222	Upper Molar, Right	2.00
		Silk, Conical	6.00	1443	91	Coxeter's Artery Forceps	1.00
		Silk, Conical, Ivory Fittings	16.00	1108	15	Dissecting Forceps	.50
2041	189	Conversation Tube, Currier's, Conical		3534	494	Stem Pessary	1.50
2040	189	Duplex		2609	291	Cracour's Oesophageal Dilator, each	2.50
1373	84	Convex Edged Tenotome	1.25	3220	443	Speculum Vaginae	6.50
2751	312	Cooling Coil, Abdominal	8.00	3958	601	Cradle, Salter's	20.00
3851	505	Esmarch's		4185	699	Wolff's Spinal	10.00 to 15.00
		Head	8.00	1461	92	Crampton's Artery Needles, per pair	5.00
		Cooling Sound, Winternitz's, Rubber	2.50	3819	552	Cranioclast, Simpson's	10.00
2925	352	Winternitz's, Silver	4.00	3813	551	Tarnier's (Basiotribe)	35.00
3983	611	Cooper's Clavicle Bandage	5.00	3817	551	Craniotomy Forceps, Meigs'	3.50
1371	84	Hernia Knife	1.25	3816	551	Meigs' Angular	3.50
1397	85	Hernia Knife	1.00	3815	551	Meigs' Straight	3.50
1413	88	Hernia Knife	1.75	3819	552	Simpson's	10.00
2758	316	Hernia Knife	1.75	3814	551	Thomas'	6.00
3932	591	Coover's Splint, Arm and Hand, each	1.50			Crawcour, see Cracour.	
3780	544	Cord Carrier (Fillet)	6.00	2442	259	Cresswell-Baber's Laryngoscope	7.50
3789	548	Scholler's	4.00	1851	151	Critchett's Eye Speculum, Over Nose	3.00
	163	Corectopy.		1852	151	Eye Speculum, Over Temple	2.50
3091	405	Cornay's Washing Bottle		1910	163	Iris Needle	1.25
		Corneal Instruments, see Ophthalmic: Cat-		1957	168	Lens Spoon, Concave	1.50
		aract.		1956	168	Lens Spoon, Flat	1.50
2039a	188	Cornets, Ear, Silver, per pair	2.50	1875	154	Strabismus Hook	1.25
2039b	188	Silver, per pair	3.00	1272	55	Crosby Invalid Bedstead	
4314	754	Corning's Carotid Artery Compressor	8.00		69	Crosby's Pocket Set	15.00
3777	542	Obstetrical Forceps	12.00	1766	145	Cross-Bar Entropium Forceps	2.25
	745	Corn Instruments:		3805	550	Crotchet (Obstetrical) and Blunt Hook	1.50
4292	746	Knife	1.00	3808	550	Bedford's	6.00
4286	746	Knife and File	.75	3807	550	Guarded	4.50
4291	746	Scalpel, Dissecting	.60 to .75	2577	283	Croup Kettle	4.50
4288	746	Scalpel, Pocket Case	1.00	1532			
		Corset, Sayre's Spinal	20.00 to 25.00	1534	98	Crown Trephine and Handle	4.00
4166	692	Smith's	20.00 to 25.00	1531	98	Crown Trephine, Guarded	6.00
1117	16	Costotome, Chisel	1.50	1531	98	with Brace	21.00
1549	90	Rib Shears	6.00	3949	597	Crutches. Prices on page 597.	
		Rib Shears, plain	5.00	1930	164	Culbertson's Iricystome	16.00
2091	195	Cotton Wool Carrier, Buck's	.50	1934	164	Iris Hook	12.00
2694	307	Kelsey's Applicator	.75	1790	147	Cupped Sound, Brewster's Lachrymal	2.50
2726	310	Porte Meche	.75	2915	351	Van Buren's Urethral	2.00
2070	193	Vulcanite	.75		116	Cupping, Dry:	
1974	174	Couching Needle	1.25	1657	116	Junod's Arm	25.00
1836	150	Couching Needle	1.25	1656	116	Junod's Boot	25.00
	582	Counter Extension:		1658	116	Thomas' Dry Cupper	1.50
3906	582	Buck's Apparatus, complete	10.00		115	Cupping Cup, Glass, per dozen	1.50
		Consisting of:		1654	115	Glass and Rubber	.75
3907	582	Adhesive Plaster and Webbing		1655	115	Glass, with Brass Fitting	.60
3908	582	Perineal Band		1653	115	Tiemann's Soft Rubber	1.00
3910	582	Splints, Coaptation				Tin	.20
3909	582	Wooden Upright and Bag				Stopcock for	.50
3911	583	Fulcrum and Weights, Buck's	4.00	1655	115	Cupping Pump	2.50
3912	583	Fulcrum and Weights, Levis'	5.00	1651	115	Cupping Scarificator, Ten Bladed	4.50
3913	583	Fulcrum, Sayre's-Buck's	4.00	1652	115	Scarificator, Twelve Bladed	4.50 to 8.00
3913	583	Sayre's Extension Sundries	1.00	1650	115	Scarificator, Tiemann's	7.00
	122	Counter-Irritation:			115	Cupping Set, No. 1, without Scarificator	9.00
1693	122	Baunscheidt's Lebenswecker	2.50		115	No. 1, with Scarificator	13.00
		Baunscheidt's Oil, Genuine	2.50		115	No. 2, without Scarificator	10.50
		Baunscheidt's Oil, Imitation	1.50		115	No. 2, with Scarificator	15.00

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
3163	428	Curette, Bladder, Mussey's	\$4.50	4396	768	Daggett's Examining and Operating Table.....	
4386	766	Bone, Volkmann's.....	2.50	750	Dangle Limbs.....		
1682	121	Dermal, Auspitz's	2.00	4301	750	Artificial Humerus.....	\$35.00 to \$70.00
1691	121	Dermal, Piffard's, each.....	2.25	1597	103	Darby's Bone Holder and Rongeur	4.00
2067	193	Ear, Bacon's	2.50	1577	102	Chisel, Gouges and Levator, per set.....	7.00
2044	191	Ear, Buck's	.75	3705	528	Clamp.....	7.00
2051	191	Ear, Quire's.....	2.25	1114	16	Darling's Chain Hook.....	.50
2068	193	Ear, Sexton's Double	2.00	17	Dissecting Set	5.75	
2048	191	Ear, Speir's	1.25	1101	15	Scalpel	.75
1832	150	Eye, Daviel's	1.25	3230	444	Darrow's Speculum Vaginae, with 2 Blades.....	12.00
2502	269	Laryngeal	3.00			Davidson's Syringe, No. 1	2.00
2201	213	Nasal, Buck's	1.00			Syringe, No. 2.....	1.50
2604	289	Pleural, Westbrook's	2.50	1832	150	Daviel's Curette	1.25
	510	Curette, Uterine:		1165	29	Davis and Kidder's Magneto-Electric Ma- chine.....	10.00
3644	511	Bozeman's	2.25	2767	317	Davis' Hernia Instrument.....	15.00
3634	511	Emmet's, Enucleator.....	1.50	4093	658	Knee-Joint Splint.....	
3635	511	Emmet's, Forceps	3.50	4055	638	Morbus-Coxarius Splint	15.00
		Engelman's	3.00	3754	539	Obstetrical Forceps	7.50
3633	510	Hanks'	2.00	4136	678	Spine Brace.....	20.00
		Munde's, Blunt	3.00	1041	6	Stethoscope.....	4.50
		Munde's, Sharp	3.00	4382	765	Dawbarn's Aseptic Saw	4.50
		Munde's, Placenta.....	1.50	4390	767	Needle Forceps	7.00
3639	511	Richardson's	6.00	1234	38	Dawson's Cautery Electrodes, per set.....	35.00
3640	511	Siemon's	2.50	3709	529	Clamp, Ovariectomy.....	8.00
3641	511	Siemon's	2.50	3237	446	Erich's Speculum	14.00
3631	510	Sims'	1.75	1232	37	Galvano-Cautic Battery.....	60.00
3632	510	Sims'	3.00	3308	454	Needle Forceps	3.50
3637	511	Skene's	1.75	2617	292	Œsophageal Forceps	
3630	510	Thomas'	1.50	3216	442	Sims' Speculum.....	5.00
3636	511	Thomas'	1.50	3217	442	Sims' Speculum, Dilating.....	7.00
3629	510	Thomas', 3 with one handle	4.50	1667	120	Vaccinator	3.50
3643	511	Thomas', Serrated	3.50	3321	456	Wire Twister	2.50
3639	511	Yarrow's, Enucleator	4.50	3163	428	Débris Curette, Mussey's.....	4.50
3306	454	Currie's Canulated Needle	7.00			Evacuators, see Lithotrity; Débris	
2041	189	Currier's Conversation Tube				Evacuators.....	
2040	189	Duplex Conversation Tube		3164	428	Syringe, Van Buren's.....	3.50
1081	12	Curtis' Section Knife.....	3.50	3165	428	Tube and Obdurator.....	2.50
1081	12	Section Knife and Frame	15.50	3809	550	Decapitating Hook	3.00
	677	Curvature, Spinal.....		3810	550	Braun's	3.00
	720	Tibial.....				Deformity Apparatus, see Orthopædic.....	
2850	342	Curve for Urethral Instruments.....		1336	80	DeGaine's Russian Needle Holder.....	4.00
1863	152	Curved Fixation Forceps.....	1.50	2771	319	De Garmo's Hernia Syringe	8.00
1877	154	Strabismus Forceps	1.50	2545	278	Delaborde's Tracheal Dilator	5.00
3205	441	Cusco's Speculum Vaginae	4.00	1860	152	De la Roza's Fixation Forceps	2.00
2390	239	Tongue Holding Forceps.....	4.50	1937	165	Iris Needle	1.75
3729	532	Cushing's Pelvic Abscess Dilating (Forceps)		4167	692	Delicate Brace for Lordosis	40.00
		Trocar	5.50	4405	769	Knife, Bozeman's	1.75
3662	513	Vulsellum Forceps.....	3.00	1342	81	Probe Director and Tongue Tie	1.00
4339	758	Cutaneous Punch, Keyes'	2.50	4332	757	Denhard's O'Dwyer's Gag	7.00
1689	121	Cutipuncture, Sherwell's.....	5.00	3751	538	Denman's Obstetrical Forceps.....	7.00
1681	120	Cutisector, Piffard's.....	5.00			Dennison's Absorbent Cotton	.30
1083	13	Piffard's	5.00	3968	603	Extension Windlass	1.50
		Cutter's Auto-Laryngoscope				Stethoscope.....	12.00
3440	486	Cup Pessary, with Belt	2.50	1217	35	Dental Electrode	1.00
3502	492	Pessary, with Belt	2.50	221		Extraction of Teeth.....	
3457	487	Ring Pessary, with Belt	2.50	222		Forceps, First Quality	2.75
1055	8	Cyrtonometer, Flint's.....	10.00	222		Forceps, Second Quality	2.00
1057	8	Warren's Conformer	6.00	222		Forceps, Third Quality	1.50
1056	8	Wood's	10.00	222		Forceps, Fourth Quality	1.25
	8	Cyrtonetric.....		2305	229	Gum Lancet	1.00
3694	525	Cyst Elevator, Borck's Ovarian.....	1.50	2308	229	Gum Lancet, Tortoise Shell	1.75
3337	464	Cystitis Eyelet, Emmet's.....	.25	2308	229	Gum Lancet, without Catch.....	1.00
3500	491	Cystocoele Pessary, Skene's.....	2.00	2302	229	Root Elevator, Screw.....	1.00
1947	168	Cystotome (Ophthalmic)	1.50	2301	229	Root Elevator, Stagfoot.....	1.00
1948	168	Græfe's	1.50	2303	229	Root Extractor	1.00
1946	168	Knapp's	1.75	2304	229	Root Extractor	1.00
1949	168	and Spoon	2.50	2307	229	Root Extractor, Angular.....	1.00
	400	Cysto-Lithic, Lithiasis Cystica, Vesical or		2306	229	Root Extractor, Curved.....	1.00
		Urinary Calculus. See Stone in the		2299	228	Turn Key, Removable Fulcrum.....	2.50
		Bladder; Stone Operations; Stone		2300	229	Turn Key, Rotating Fulcrum	2.50
		Searcher; Lithoclast.....		2297	228	Turn Key, Spring Bolt.....	3.00
	406	Cysto-Lithic, Litholapaxy. See Lithoto- my; Lithotrity.....		2298	228	Turn Key, Spring Bolt.....	3.00
2175	208	Czermack's Uvula Hook.....	2.50	1776	146	Depilator, Henry's.....	2.50

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.		
2815	331	Depilator, Henry's.....	\$2.50	4402	769	Dilator, Canalicula, Blitz's.....	\$4.00
		Depressor, Tongue, see Tongue Depressor.		1793	147	Canalicula, Galezowsky's	2.50
3253	448	Urethral and Perineal.....	2.50	1788	147	Canalicula, Weber's.....	1.00
3247	448	Perineal, Bozeman's.....	2.50	1789c	147	Canalicula, Williams'.....	1.00
3235	445	Vaginal, Garrigue's.....	2.00			Laryngeal, see Laryngeal Dilators.	
3252	448	Vaginal, Hunter's.....	1.50	3149	425	Lithotriety, Dolbeau's.....	24.00
3234	445	Vaginal, Nott's.....	1.50	3150	425	Lithotriety, Guyon Duplay's.....	45.00
3249	448	Vaginal, Nott's.....	1.50	2863	344	Meatus Urinarius, Otis'.....	1.50
3250	448	Vaginal, Sims'.....	1.50	2149	205	Nasal, Woakes'.....	18.00
3251	448	Vaginal, Sims' Double.....	1.50	2148	204	Nasal, Yearsley's.....	.50
3127	419	Depuytren's Bistoury Caché.....	24.00			See Esophageal Stricture Dilators, Prostatic Dilator, Rectal Dilator, Tracheal Dilator, Urethral Stricture Dilator, Uterine Dilator and Vaginal Dilator.	
2752	313	Enterotome.....	5.00	2031	188	Dionisius' Ear.....	16.00
3956	600	Fibula Splint.....		2029	188	Dipper Ear Trumpet.....	4.50
3123	417	Lithotomy Scalpel.....	1.75	1807	148	Director, Bowman's.....	.50
3156	426	De Rigal's Stone Holder, Perforator and Breaker.....	60.00	1346	81	Hamilton's, per set.....	2.50
	120	Dermic:				Herniotomy, see Herniotomy Director.	
1675	120	Acne Lance and Comedone Extractor.....	2.50	1347	81	Hunter's.....	.75
1674	120	Comedone Extractor, Piffard's.....	.75	3113	417	Little's.....	1.50
1691	121	Curette, Piffard's.....	2.25	1345	81	Director and Aneurism Needle.....	.75
4339	758	Cutaneous Punch, Keyes'.....	2.50	1342	81	Director and Tongue Tie.....	1.00
1689	121	Cutipuncture, Sherwell's.....	5.00	1344	81	and Tongue Tie.....	.50
1681	120	Cutisector, Piffard's.....	5.00	1213	35	Disk Electrode.....	.50
1683	121	Depilating Forceps, Henry's.....	2.50	1219	35	Electrode.....	1.00
1685	121	Epilating Forceps.....	1.50		610	Dislocation and Luxation:	
1687	121	Galvano-Depilator, Duhring's.....	3.00	3993	615	Bigelow's Apparatus.....	
1688	121	Galvano-Depilator, Fox's.....	3.90		611	Dislocation of Clavicle:	
1678	120	Grappling Forceps.....	3.00	3983	611	Cooper's Apparatus.....	5.00
1686	121	Irido-Platinum Needle, Piffard's.....	1.00	3985	612	Mayor's Apparatus.....	5.00
1680	120	Milium Needle, Piffard's.....	1.25	3984	612	Smith's Apparatus.....	
1690	121	Nævus Needle.....	.50		614	Dislocation of Phalanges:	
1688	121	Needle Holder, Fox's.....	3.50	3991	614	Charriere's Luxation Forceps.....	9.00
1676	120	Pleximeter, Glass, Hess'.....	.50	3987	614	Levis' Splint.....	1.50
1679	120	Scarifying Spud, Piffard's.....	1.25	3990	614	Luer's Luxation Forceps.....	8.00
1682	121	Scoop, Auspitz's.....	2.00	3989	614	Plain Luxation Forceps.....	4.00
1677	120	Skin-grafting Scissors.....	10.00		611	Dislocation of the Shoulder Joint:	
1684	121	Tattooing Instrument, Piffard's.....	4.50	3982	611	Apparatus for Preventing.....	6.00 to 9.00
1818	149	Desmarre's Caution Iron.....	3.00	3981	610	Dislocation Pulleys, Brass, per pair.....	7.00
1764	145	Entropium Forceps.....	3.00	3992	615	Japanned, per pair.....	5.00
1854	151	Eyelid Retractor.....	1.75		483	Displacements, Uterine.	
1855	151	Eyelid Retractor.....	1.75	17	Dissecting Cases. (Lists and Prices, p. 17.)		
1819	149	Many-pronged Hook.....	2.00	1143	19	Forceps.....	1.00
1889	162	Paracentesis Trocar.....	1.75	1141	19	Forceps.....	.75
1780	146	Scarificator.....	1.50	1142	19	Forceps.....	.75
2856	843	Desormeaux's Endoscope.....	60.00 to 125.00	1108	15	Forceps, Coxeters'.....	.50
4201	709	Detmold's Ankle Spring.....	4.00 to 6.00	1102	15	Forceps, Plain.....	.50
1524	97	Metacarpal Saw.....	1.50	1104	15	Hook.....	.50
4260	737	Scarpa Shoe.....	5.00 to 8.00	1123	16	Hook, Grappling.....	.60
2053	191	Devil's Screw Hook.....	1.75	1126	16	Hooks, Chain.....	.25
3790	548	Dewey's Placenta Hook.....	1.00	1114	16	Hooks, Darling's.....	.50
	1	Diagnostic.		1121	16	Hooks, Double.....	.50
2015	185	Tube, Toynbee's.....	.75	1103	15	Knife, Cartilage.....	.60
	186	Diapason.....		1101	15	Scalpel, Darling's.....	.75
2869	345	Dick's Bougie à Boule.....	1.00			Scalpel, Glazed.....	.60
2914	351	Caustic Syringe.....	3.50	1105	15	Scissors.....	.75
3405	477	Caustic Syringe.....	3.50			Scissors, Curved.....	1.00
3204	439	Dicken's Speculum Vaginæ.....	9.00			Dittel's Elastic Ligature, per yard.....	.25
4381	765	Diefenbach's Needle Forceps.....	3.00			Divulsor, see Urethral Stricture Divulsor.	
1732	120	Dieulafoy's Aspirator, Large.....	50.00	1833	150	Dix's Spud.....	1.25
1732	120	Aspirator, Small.....	40.00	2570	282	Dobell's Residual Air Pump.....	3.00
1040	6	Differential Stethoscope, Allison's.....	4.50	1025	5	Stethoscope.....	1.50
	394	Digital Exploration of the Bladder:		2389	239	Tongue-Holding Forceps.....	4.50
	394	Thompson's Method.....		2814	331	Doisneau's Compress.....	4.00
3051	394	Thompson's Urethral Knife.....	1.75	3149	425	Dolbeau's Dilator.....	24.00
3052	394	Thompson's Vesical Director.....	2.50	3151	425	Guide for Lithoclast.....	3.50
3053	395	Thompson's Vesical Forceps.....	5.50	3152	425	Lithoclast.....	7.00
3054	395	Thompson's Vesical Forceps.....	5.50		424	Operation.....	
3055	395	Thompson's Vesical Forceps.....	5.50	3172	431	Dome Top Speculum Vaginæ.....	1.50
	390	Dilatation of the Bladder.....		1722	127	Dome Trocar, Fitch's Aspirating (4, 5).....	2.50
2898	348	Dilating Catheter and Syringe, Otis'.....	4.50	1722	127	Fitch's Ovarian (1, 2, 3).....	14.00
3302	453	Forceps, Vesico-Vaginal, Thomas'.....	3.00				
2647	300	Dilator, Anal.....	10.00				
2650	300	Anal, Sims'.....	4.50				
2652	300	Anal, Thebaud's.....	12.00				

FIG.	PAGE.		PRICE
3539	495	Donaldson's Flexion Pessary	\$2.00
3540	495	Flexion Pessary	2.00
3456	487	Uterine Supporter	2.50
2086	195	Donder's Ear Spout	.75
3422	482	Double Current Catheter, Nott's, Female ..	2.50
3046	389	Nott's, Male	3.00
3045	389	Silver	5.00
3044	389	Tiemann's "Velvet Eyed," Soft Rubber	2.50
1914	163	Double-Edged Iris Knife	2.00
1873	154	Double Hook, Eye, Sedillot's	1.50
1868	152	Fixation	1.50
1390	84	Operating, Ferruled	2.50
		Operating, Riveted	2.00
3946	597	Double Incline Plane (Splint)	4.00 to 6.00
1122	16	Double Rachitome	15.00
3558	497	Double Tenaculum, Emmet's	5.00
3559	497	Sims'	3.50
3556	497	Double Tenaculum Forceps, Byrne's	6.00
3553	497	Hanks'	3.00
3557	497	Wooster's	2.50
3554	497	Wylie's	3.00
2074	194	Douche, Aural, Lucac's Reflux	1.50
2079	194	Aural, Sexton's	10.00
2183	210	Catarrhal, Warner's	1.00
1824	149	Eye, Agnew's	3.50
		Nasal, see Nasal Douche.	
		Uterine, see Uterine Irrigation, Douching.	
		Vaginal, see Vaginal Syringe.	
2144	201	Vapor, Buttle's	2.00
2141	201	Vapor, Hardy's	4.00
1279	75	Wound Cleansing	6.00
3850	564	Wound Cleansing, Esmarch's	4.50
3854	567	Wound Cleansing, Wyeth's	4.00
3131	421	Dowell's Gorget and Staff	5.50
2764	317	Hernia Needle, Curved	1.00
2764	317	Hernia Needle, Straight	1.00
3182	433	Speculum Vaginæ	1.50
3131	421	Staff and Gorget	5.50
4282	744	Doyle's Rectangle.	
4281	744	Spiral Spring Rotator, Double	23.00 to 35.00
4281	744	Spiral Spring Rotator, Single	20.00 to 25.00
	75	Drainage.	
		Drainage, Supra-Pubic Vesical:	
4362	763	Keyes' Device for	
4364	763	Keyes' Tube for	
		See also Aspirator, Trocar, Ovariectomy Drainage.	
1287	75	Drainage Canula, Callender's	3.00
1286	75	Punch, Heuel's	1.50
1284	75	Trocar, Chassaignac's	4.00
		Trocar, Southey's	5.00
	75	Tube, Chicken Bone.	
1282	75	Tube, Ellis's Spiral	.75
2126	197	Tube, Gruening's Mastoid	.75
2124	197	Tube, Knapp's Mastoid	.75
2125	197	Tube, Knapp's Mastoid	.75
		Tube Ovariectomy, see Ovariectomy, Drainage.	
		Tube, Tiemann's Velvet-eyed	2.00
1283	75	Tube Carrier, Hamilton's	5.00
1466	92	Tube Carrier, Ostrom's	3.00
1285	75	Tubing, Black Rubber, per yard	.40
3764	540	Draper's Obstetrical Forceps	8.50
2693	307	Dressing Forceps, Anal	2.00
1288	76	Pocket Case	1.50
1290	76	Pocket Case	1.50
1293	76	Spring	1.00
3378	475	Uterine	2.00
3379	475	Uterine	2.50
3383	475	Uterine	2.00
3384	475	Uterine, Bozeman's	2.50
3383	475	Uterine, Elliott's	2.00

FIG.	PAGE.		PRICE.
3381	475	Dressing Forceps, Uterine, Jones'	\$6.00
3377	475	Uterine, Nunn's	6.00
3376	475	Uterine, Slide Catch	3.00
3382	475	Dressing Forceps and Scissors, Nunn's	5.00
1295	76	Old's	3.50
	74	Dressing of Wounds, Materials for, see Antiseptic Surgery Materials.	
1289	76	Dressing Scissors	1.25
3957	600	Splints, Set of 5	.50
		Splints, Basswood, Set of 12	1.00
		Drill, Mastoid, see Mastoid Process Drill.	
1129	18	Medulla Oblongata	1.75
		Osteotomy, see Osteotomy Drill.	
1827	150	Drop Glass for the Eye	.20
2471	265	Tube, Laryngeal, Hartwell's	2.25
	40	Dry Cold and Heat.	
	116	Dry Cupping :	
1657	116	Junod's Arm	25.00
1656	116	Junod's Boot	25.00
1658	116	Thomas' Dry Cupper	1.50
1388	84	Dry Dissector, Hamilton's	1.50
1389	84	Hamilton's	1.50
1393	84	Hamilton's	1.50
1394	84	Hamilton's	1.50
1205	34	Duchenne's Electrodes, per pair	2.50
1075	12	Exploring Trocar	2.50
1076	12	Exploring Trocar	3.50
1070	11	Dudgeon's Sphygmograph	25.00
1857	152	Dudley's Fixation Forceps	3.00
1341	81	Needle Forceps	4.50
1744	134	Ophthalmoscope	30.00
		Dugas' Abdominal Supporter	5.00
1301 }	77	Caustic Case	5.00
1302 }	72	Dressing Case	18.00
	72	Pocket Case	56.00
1687	121	Duhring's Galvano Depilator	3.00
4070	645	Duncan Eve's Splint	50.00 to 60.00
		Dunster's Dressing Forceps	1.50
1725	127	Ovarian Trocar	6.00
		Thermometer	3.50
3150	425	Duplay's Dilator, Lithotrixy	45.00
2170	208	Rhinoscope	8.00
1555	100	Durham's Retractor	3.00
2327	232	Seizing Forceps	4.50
2398	243	Seizing Forceps	4.50
2556	279	Trachea Canula	10.00
1061	9	Dynamograph	75.00
1059	9	Dynamometer	8.00
1060	9	Hamilton's	5.00
	203	Ear, Artificial	100.00
2031	188	Dionisius'	16.00
		Ear Instruments, see Aural.	
		Ear Trumpets :	
2025	187	Apparitor Auris, per pair	6.00
2026	187	Auricles	5.00
2024	187	Compact	3.00, 3.25 and 3.50
2036	188	Conversation Tube, Mohair	2.50
		Conversation Tube, Mohair, Conical	4.00
		Conversation Tube, Silk	4.00
		Conversation Tube, Silk, Conical	6.00
		Ivory Fittings	16.00
2034	188	Corrugated Trumpet	4.00
2041	189	Currier's Conical Conversation Tube	
2040	189	Currier's Duplex Conversation Tube	
2029	188	Dipper Trumpet	4.50
2037	188	Dome Trumpet	2.50 to 5.00
2031	188	Ear of Dionisius	16.00
2027	187	German Silver	6.00
2028	187	Japanned, Conical	3.00
2032	188	London Hearing Horn	4.00 to 5.00

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Ear Trumpets:		1176	32	Electrode, Catheter, Nunn's	\$4.00
2033	188	Long, Japanned	\$2.25 to \$4.00	1202	34	Catheter, Silver	2.50
2030	188	Martineau Hearing Horn	4.50	1203	34	Catheter, Silver	2.50
2039a	188	Silver Cornets, per pair	2.50	1195	34	Comb	1.50
2039b	188	Silver Cornets, per pair	3.00	1217	35	Dental	1.00
2035	188	Telescopic Trumpet	4.50	1213	35	Disk, each	.50
2023	187	Toynbee's Artificial Tympanum	.30	1219	35	Disk, Insulated Points	1.00
2038	188	Walking Cane Trumpet	6.00 to 25.00	1205	34	Duchenne's, per pair	2.50
1054	7	Echoscope, Speir's	6.00	1209	35	Ear	2.75
4275	741	Eclipting Spring for Flat Feet, per pair	5.00	1225	36	Ear, Double	2.00
		Ecraseur (see also Ligator):		1200	34	Elastic, Urethral or Uterine	3.00
3667	515	Barnes' Wire	5.00	1212	35	Eye	.75
2208	215	Bettmann's Snare	8.50	1214	35	Eye Cup	2.00
2064	192	Blake's Snare	3.50	1215	35	Faradization Points	1.00
2207	215	Bosworth's Snare	5.00	1181	33	Foot Plate, Flannel Covered	4.00
2042	190	Bosworth's Snare	4.00	1231	36	Foot Plate, Metallic	.50
		Bosworth's Snare, with Straight and		1216	35	Hair Brush	2.50
		Curved End	5.00	1180	33	Hand Plate	1.50
3670	515	Braxton Hicks'	15.00	1206	34	Laryngeal	1.50
3671	515	Braxton Hicks', Modified	15.00	1207	34	Laryngeal	1.50
1233	37	Cautery Sling	16.00	1204	34	Laryngeal	1.00
3663	514	Chassaignac's	25.00	2498	269	Laryngeal, Mackenzie's	3.50
3666	515	Cintrat's Ligator	2.50	1182	33	Long Handle	1.50
3683	519	Cintrat's Serre Nœud	10.00	1231	36	Metallic Foot Plate	.50
4328	756	Cohen's Combination Snare		1218	35	Metallic Handle, per pair	1.50
4326	756	Cohen's Snare	4.00	1215	35	Metallic Points, Faradization	1.00
3673	515	Edward's	18.00	1211	35	Metallic Scourge	.75
3665	514	Emmet's	35.00	1226	36	Metallic Sound	.75
2497	268	Gibb's Laryngeal	3.00	1191	34	Nasal	1.00
2205	214	Jarvis' Snare	4.00	1192	34	Nasal and Aural	.75
3684	519	Koerberle's Serre Nœud, per set	12.00	1208	35	Neck	2.00
2434	254	Penn's	5.00	1229	36	Needle Holder, No. 1, for One Needle	.60
3675	516	Sajou's	4.00	1229	36	No. 2, for Two Needles	1.00
		Sajou's, with Straight and Curved		1229	36	No. 3, for Three Needles	1.25
		Ends	5.00	1229	36	No. 4, for Four Needles	1.50
3677	516	Sims' Porte Chain	35.00	1229	36	No. 5, for Five Needles	1.75
4341	759	Skene's Wire	7.50	1229	36	No. 6, for Six Needles	2.00
3669	515	Smith's Wire, Curved	6.00	1176	32	Nunn's Catheter	4.00
3668	515	Smith's Wire, Straight	5.00	1198	34	Olives, each	.20
3672	515	Thompson's	25.00	1221	35	Pole Changer	5.00
3674	515	Tiemann's Long Chain	20.00	1174	32	Post's Warm Water	2.75
		Tiemann's Small Chain	12.00	1183	33	Rectal, Ball	1.25
		Tiemann's Small Chain, Straight	10.00	1230	36	Rectal, Insulated	2.50
2063	192	Wilde's Polypus Snare	3.50	1185	33	Rectal, Insulated	2.00
		Ectropium, see Ophthalmic, Palpebral.		1184	33	Rectal, Nickel-plated	1.25
3398	476	Edward's Caustic Holder	2.50	1188	33	Rectal, Nickel-plated, Large	1.40
3673	515	Ecraseur	18.00	1226	36	Sound	.75
3542	495	Stem Pessary	3.00	1199	34	Spiral, Uterine or Urethral	1.25
2583	284	Edson's Spray Producer		1182	33	Sponge-covered	1.50
		Ehrich's Speculum	13.00	1220	35	Sponge Cup	.50
		Eiterbecken, see Pus Basin.		1187	33	Sponge Cup	1.00
		Elastic Belt, see Abdominal Belt.		1186	33	Sponge Holder	.50
2090	195	Elastic Caustic Holder	2.00	1224	35	Sponge Holder and Current Breaker	4.00
		Elastic Ligature, Dittel's, per yard	.25	1194	34	Tongue	1.00
1283	75	Elastic Ligature Carrier, Hamilton's	5.00	1193	34	Tonsil	1.00
1467	92	Helmuth's	3.50	1179	33	Universal Handle, per pair	1.50
1466	92	Ostrom's	3.00	1201	34	Urethral	1.25
2688	306	Elastic Probe	.50	1201	34	Uterine	1.25
2810	330	Elastic Stockings. Prices on page 330.		1197	34	Uterine, each	2.00
		Elbow and Wrist Splint, Andrew's		1228	36	Uterine	2.50
4125	669	Stillmann's	25.00	1200	34	Uterine, Elastic	3.00
		Elbow-Joint, Dislocation of.		1199	34	Uterine, Spiral	1.25
4134	676	Elbow Splint, Stromeyer's	18.00	1222	35	Vaginal, Insulated	4.00
1351	82	Eldridge's Bullet Probe	.75	1223	35	Vaginal, Insulated	4.00
2881	346	Path-Finder, Urethral	35.00	1190	33	Vaginal, Insulated	2.50
1154	23	Electric Disk, Garratt's. Prices on page 23.		1189	33	Vaginal, Nickel-plated	1.50
1208	35	Electrode, Arm	2.00	1178	33	Wheel	5.00
1192	34	Aural and Nasal	.75			Electrodes in Cases, Set No. 1	80.00
1210	35	Ball	.75			Set No. 2	15.00
1170	32	Beard's Base Needles, each	.75	1161	31	Tiemann & Co.'s Set	12.00
1167	30	Beard's Current Changer	10.00	1989	176	Electro-Magnet, Bradford's	25.00
1166	30	Beard's, with Band	1.50	1840	150	Gruening's	12.00
		Bosworth's, Set in Case	33.00	1177	32	McIntosh's, without Cell	10.00
1196	34	Brush, Metallic	1.00	1177	32	McIntosh's, with Cell	15.00

FIG.	PAGE.		PRICE.
	176	Electro-Magnet in Ophthalmic Surgery.	
1172	32	Electro-Massage Instrument, Butler's..... \$	
1171	32	Post's	
	37	Electro-Surgery, see also Galvano-Cautery.	
	23	Electro-Therapeutic :	
1156	24	Armadillo. Prices on page 24.	
1154	23	Garratt's Disks. Prices on page 23.	
		See also Battery and Electrode.	
1227	36	Electrolysis Needles, each	1.00
1227	36	Platinum	2.00
4344	759	Platinum, Freeman's	5.00
2286	227	Elevating Forceps, Dental	2.75
2302	229	Elevator, Screw	1.00
1544	98	Trepanning	1.00
		Uterine, see Uterine Repositor.	
1545	98	Elevator and Lenticular Knife	1.75
1547	98	Elevator and Rasp	1.25
3589	502	Ellinger's Uterine Dilator	10.00
3595	503	Uterine Dilator	10.00
3573	500	Elliott's Intra-Uterine Speculum	7.00
3747	598	Obstetrical Forceps	9.50
	553	Set of Obstetrical Instruments	35.00
	471	Uterine Set	25.00
3431	488	Uterine Sound	7.00
1024	5	Elliottson's Stethoscope	5.00
1282	75	Ellis' Drainage Spiral	.75
1068	11	Elsberg's Esthesiometer	7.00
2047	191	Angular Screw Hook	2.00
2474	265	Insufflator	2.00
2153	205	Nasal Speculum	5.00
2445	260	Pocket Laryngoscope	6.00
2474	265	Powder Blower	2.00
2469	265	Sponge Holder and Throat Forceps ..	6.00
2386	239	Tongue Depressor	4.50
2549	278	Trachea Tube, with Valve	8.00
2020	185	Ely's-Siegle's Otoscope	7.00
	14	Embalming.	
1099	14	Pump	22.00
3793	548	Embryotomy Forceps, Bacheider's ..	12.00
3791	548	Tiemann & Co.'s	3.00
	625	Emergency Operating Sets :	
4017	625	Heuel's Pocket Set	60.00
4038	628	Smith's Compact Pocket Set	18.00
4040	629	Smith's General Operating Set	200.00
4041	630	Tremaine's Operating Bag	175.00
3394	476	Emmet's Applicator	1.50
1738	133	Aspirator	12.00
3300	453	Ball and Socket Knife	5.00
		Ball and Socket Knife, Improved ..	7.00
		Bed Pan, Copper	6.00
3343	466	Buttonhole Scissors	8.00
3317	456	Counter-pressure Hook	1.25
3635	511	Curette Forceps	3.50
3337	464	Cystitis Eyelet	.25
3558	497	Double Tenaculum	5.00
3665	514	Ecraseur	35.00
3634	511	Enucleator	1.50
3338	465	Fistula Tube	.30
1320	79	Needle, per dozen	1.50
3307	454	Needle Forceps	3.00
1723	127	Ovarian Trocar	4.50
		Perineal Retractor	7.00
3465	489	Ring Pessary	.50
3299	453	Scissors, Double Curved	4.50
3297	453	Scissors, Knee Bent	4.50
3298	453	Scissors, Slightly Curved	4.50
	462	Set of Vesico-Vaginal Instruments ..	80.00
3501	491	Smith's Pessary	.50
3236	445	Speculum Vaginae	7.00
3600	504	Sponge Dilator	2.50
3257	449	Tenaculum	1.25
3258	449	Tenaculum	1.25
3259	449	Tenaculum	1.50
3261	449	Tenaculum	1.25

FIG.	PAGE.		PRICE.
3558	497	Emmet's Tenaculum, Double	\$5.00
3315	456	Twisting Forceps	3.00
3343	466	Urethral Buttonhole Scissors	8.00
3603	504	Uterine Dilator	2.00
3427	483	Uterine Elevator	4.50
3300	453	Uterine Knife	5.00
1441	90	Uterine Tourniquet	5.50
3676	516	Uterine Tourniquet	5.50
3824	554	Uterine Tourniquet	5.50
3603	504	Water Dilator	2.00
305		Enema Apparatus, see also Rectal Infusors,	
		Injectors and Irrigators.	
		Endermic, see Hypodermic.	
2858	344	Endoscope, Auspitz's	20.00
2856	343	Desormeaux's	60.00 to 125.00
2852	343	Glass (Meatoscope), each	.50
2855	343	Laveur's	20.00
4366	764	Klotz's	8.50
2857	343	Otis' Endoscopic Tube	1.50
2860	344	Plain, Glass Front	
2861	344	Skene's	2.75
2854	343	Skene's Urethral Speculum	2.50
2859	344	Smith's Urethroscope	8.50
2853	343	Weir's Meatoscope	1.25
		Engelman's Placenta Curette	3.00
2842	339	English Sound Gauge	3.50
	65	Enos' Minor Operating Set	33.00
1107	15	Enterotome	2.50
2752	313	Depuytren's	5.00
1766	145	Entropium Forceps, Cross-Bar	2.25
1764	145	Desmarre's	3.00
1760	145	Knapp's	4.00
1765	145	Laurence's	3.00
1768	145	Prout's	4.00
1762	145	Roehrich's	3.00
1761	145	Snellen's	2.50
1763	145	Tiemann & Co.'s	7.00
1767	145	Tiemann & Co.'s	7.00
1986	175	Enucleation Scissors	1.50
1988	175	Spoon, Wells'	2.75
3634	511	Enucleator, Emmet's	1.50
3652	512	Sims'	3.50
3653	512	Sims' Blunt Hook	3.50
3638	511	Yarrow's	4.50
	255	Epiglottis.	
2499	269	Pincette, Brun's	4.50
1773	146	Epilating Forceps, Cilia	1.00
1775	146	Gruening's	1.75
1776	146	Henry's	2.50
1774	146	Piffard's	1.50
	532	Episiorrhaphy.	
	212	Epistaxis.	
2196	212	Canula, Belocq's, Plated	2.00
2196	212	Canula, Belocq's, Silver	3.00
2194	212	Clamp, Caro's	.75
2195	212	Tampon, Rubber	.75
1433	89	Erichson's Arterial Compressor	25.00
1454	91	Esmarch's Artery Forceps, Bulbous ..	2.50
1453	91	Artery Forceps, Fenestrated	3.00
1455	91	Artery Forceps, Torsion	2.50
4020	626	Artery Forceps, Torsion	2.50
1440	90	Bandage, Tourniquet	3.50
1432	89	Bandage Clamp	.75
3877	574	Bandage Knife	3.00
3878	574	Bandage Shears	4.50
	90	Bloodless Method.	
3851	565	Cooling Coil	
3850	564	Irrigator	4.50
3877	574	Knife and Wedge	3.00
1298	76	Knife and Wedge	3.00
3715	530	Ovariectomy Clamp	6.00
4404	620	Splint, Ankle	
3996	617	Splint, Langensalza	
3994	617	Splint, Wrist	

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
3852	565	Esmarch's Syphon for Cooling Wounds..... \$	4204	710	Extension for Short Leg, and Weak Ankle
1440	90	Tourniquet..... 3.50			Brace (Shoes extra) \$18.00
		Ether Inhaler, see Anæsthetic Inhaler.	576		Extension and Counter-extension.
2802	323	Eugene Abdominal Supporter..... 6.00	3906		
	199	Eustachian Canal.	to 582		Buck's Extension, Complete..... 10.50
2130	199	Eustachian Catheter, Coin Silver..... 1.50	3910		
2138	199	Ferguson's..... 2.00	3911	583	Buck's Fulcrum and Weights 4.00
2136	199	Fitzgerald's..... 2.50	3912	583	Levis' Fulcrum 3.50
2130	199	Hard Rubber ..... .75	3912	583	Levis' Fulcrum and Weights 5.00
2130	199	Nickel-plated ..... .75	3913	583	Sayre's Extension Sundries 1.00
2135	199	Noyes', Left 2.50	3913	583	Sayre's Extension Sundries and Buck's
2135	199	Noyes', Right 2.50			Fulcrum 4.00
2130	199	Pure Silver..... 2.00	175		Extirpation of the Eye-Ball:
2132	199	Sexton's..... 1.25	1985	175	Ball's Double Hook 3.00
2130	199	Silver (Coin) 1.50	1984	175	Forceps, Blitz's 3.00
2137	199	Woake's..... 1.50	1987	175	Forceps, Bull-dog..... 2.50
2134	199	Eustachian Catheter Holder, Bonafont's .. 2.00	1986	175	Scissors 1.50
2133	199	Pomeroy's..... 3.50	1988	175	Spoon, Wells' 2.75
2131	199	Wire Clamp..... 1.00			See also Enucleation.
	201	Eustachian Tube Inflators:	383		Extrophy of Bladder.
		Politzer's Air Bag..... 1.50	3013	383	Tiemann's Apparatus for .. 35.00 to 100.00
2139	201	Politzer's Air Bag..... 2.00	4313	754	Eye, Artificial, Composition..... 8.00
2140	201	Roosa's-Politzer's Air Bag..... 3.50	1990	177	Artificial, Glass..... 10.00
2142	201	Sexton's Insufflator 2.00	1828	150	Eye Bath Glass ..... .50
2145	201	Sexton's Nozzle..... 1.00	179		Eye Cases, Sets of Instruments.
2143	201	Eustachian Spray, Hackley's..... 6.50	1214	35	Eye Cup Electrode 2.00
	201	Eustachian Vapor Douches:	1824	149	Eye Douche, Agnew's 3.50
2144	201	Buttle's Inhaler..... 2.00	1825	149	Stop-cock for 1.00
2141	201	Hardy's Chloroform Douche..... 4.00	1212	35	Eye Electrode, Small..... .75
		Evacuating Apparatus, see Lithotrity: Dé-	134		Eye Instruments, see Ophthalmic.
		bris Evacuators.	2101	196	Eyelet, Politzer's ..... .30
	65	Eve's Minor Operating Set 33.50	2101	196	Eyelet Forceps, Politzer's..... 1.50
4070	645	Leg Extension Brace 50.00 to 60.00			
		Eversion of Feet, see Orthopædic: Deform-			
		ities of the Feet.	2401	244	Fahnstock's Tonsilotome..... 8.00
	216	Evulsion of Hypertrophied Nasal Tissue.	747		False Joints (Pseudarthrosis).
2210	216	Robinson's Forceps for 4.50	1569	101	Farabocuf's Osteophor 7.00
2283	227	Excising Forceps, Dental 2.75	1164	29	Faradic Battery, McIntosh's Family 10.00
2284	227	Dental 2.75	1161	27	McIntosh's Physicians' 18.00
	616	Excision of Joints.	1215	35	Faradization Points 1.00
	69	Exhibition Pocket Set..... 100.00	84		Fasciotomy, see also Minor Surgery Instru-
		Expeller, see Sponge Tent Expeller.			ments.
	394	Exploration, Digital, of the Bladder.	2503	269	Fauvell's Laryngeal Polypus Forceps..... 4.00
2017	185	Explorer, Toynbee's..... .75	2506	270	Throat Forceps 6.00
1309	77	Exploring Director 1.00			Feeding Tube, English, Plain 1.50
1307	77	Needle ..... .75	2622	294	English, Funnelled 1.75
	190	the Eustachian Canal.	2627	296	English, Funnelled 1.75
1079	12	Exploring Trocar..... 1.50	2626	296	French, Funnelled..... 1.00
1075	12	Duchenne's..... 2.50	2620	294	Paine's Nasal, "Velvet Eyed" 1.00
1076	12	Duchenne's..... 3.50	2665	303	Tiemann's "Velvet Eyed," Rectal 1.50
1077	12	Noegerrath's..... 3.50	2621	294	Tiemann's "Velvet Eyed," Stomach. 1.50
1078	12	Tiemann & Co.'s..... 2.50	2621	294	Tiemann's "Velvet Eyed," Stomach,
1715	126	Exploring Trocar and Case 2.50			Long 2.00
	104	Exsection, see also Osteotomy.			Feet, Bones of the, see Osteological.
	619	Excision of Joints.			Deformities of the, see Orthopædic.
	106	Case, Set of Instruments 65.60	1005	3	Fehlich's Flask, Burner and Curette..... 4.75
4002	619	Drills, Wyeth's, per set..... 7.00			Femur, Fracture of, see Fracture of Femur.
		Saw, see Osteotomy: Resection and			Un-united Fracture of, see Pseudar-
		Exsection Saws.			throsis.
4001	618	Spike, for Transfixion of Bones..... .75			Felt, Russian, per square foot ..... .80
	617	Exsection Splints, for Securing Immobility:	4165	692	Felt Jacket, Spinal 25.00
4004	620	Esmarch's Ankle 5.50	577		Felt Splints. Send for Price List.
3996	617	Esmarch's Elbow, "Langensalza".....	1452	91	Fenestrated Artery Forceps 2.00
3994	617	Esmarch's Interrupted, for Wrist.....	2049	191	Ear Scoop 1.50
4003	619	Packard's.....	1959	168	Lens Scoop, Levis' 1.50
4008	620	(Tillman's Ankle Bracket.....	2138	199	Ferguson's Eustachian Catheter..... 2.00
3997	618	Stillman's Elbow Bracket.....	1565	101	Lion-jaw Bone-holding Forceps 3.00
3998	618	Stillman's Wrist Bracket.....	1567	101	Lion-jaw Bone-holding Forceps 3.00
4006	620	Volkmann's Dorsal 25.00	3078	402	Lithotrite ..... .50
4000	618	Watson's Suspension Bar.....	3174	431	Mirror Speculum, Glass 2.50
1614	107	Exsector, Gowan's..... 24.00	1568	101	Sequestrum Forceps..... 1.50
1615	107	Wyeth's..... 20.00	1033	5	Stethoscope..... .50
3948	597	Extension Bar for Thigh Fractures 5.00 and 6.00	2635	298	Tubular Speculum, Glass 1.00
4203	710	Extension for Short Leg (Shoes extra)..... 9.00			Tubular Speculum, Hard Rubber

FIG.	PAGE.		PRICE.
		Ferguson's Tubular Speculum, Hard Rubber, with Nickel-plated Metal Mirror, \$1.50	
3171	431	Tubular Speculum, Metal	1.50
1366	84	Feruled Operating Scalpels, &c.	1.25
		Ivory Handled	1.50
1429	88	Field Tourniquet, Prussian	.75
1429	88	U. S. Army	1.00
2876	345	Filiform Bougie, Nos. 0, 1, 2, each	.50
2880	346	Banks' Whalebone	1.25
2878	346	Gouley's Whalebone	.50
3780	544	Fillet, Obstetrical	6.00
1007	3	Filtration Apparatus, Rapid	5.00
1396	85	Finger Knife	1.00
1367	84	Knife, Bistoury	1.25
1507	96	Knife, French	2.50
1508	96	Knife, French	2.00
		Luxation of, see Luxation.	
2793	323	Pad Truss, Tiemann's	5.00
2529	277	Protector	2.00
2457	264	Sponge Holder	1.50
1109	15	Finnell's Knife, Saw and Handle	4.50
1317	79	Post Mortem Needle	.20
	17	Post Mortem Set	12.50
1940	165	Fischer's Iris Forceps	1.25
2830	336	Fisher's Phimosis Forceps	3.00
		Fistula Lachrymalis Knife, see Ophthalmic: Lachrymal.	
3338	465	Fistula Tube, Emmet's	.30
	448	Vesico and Recto-Vaginal	
	449	Vesico-Vaginal	
2803	328	Fitch's Abdominal Supporter	4.00 to 6.00
1722	127	Aspirator Needles, Nos. 4, 5	2.50
1722	127	Clamp Forceps, No. 6	4.50
3012	381	Dome Trocar Catheter	6.00
1741	133	Handy Aspirator	5.00
1722	127	Ovarian Dome Trocar, Nos. 1, 2, 3	14.00
3369	474	Uterine Sound	2.00
3316	456	Wire Twister	4.50
2136	199	Fitzgerald's Eustachian Catheter	2.50
1859	152	Fixation and Tumor Forceps	1.50
	152	Fixation Forceps (Ophthalmic):	
1858	152	Carron de Villard's	3.00
1863	152	Curved	1.50
1860	152	De la Roza's	2.00
1857	152	Dudley's	3.00
1862	152	Graefe's	2.00
1864	152	Jaeger's	8.00
1861	152	Noyes'	3.00
	152	Fixators (Ophthalmic):	
1868	152	Double Hook	1.50
1864	152	Jaeger's	8.00
1865	152	Noyes'	2.00
1866	152	Pamard's Pique	1.50
1867	152	Three-pointed	1.50
3555	497	Fixator, Uterine, Byrne's	2.50
		See Uterine Tenaculum and Uterine Tenaculum Forceps.	
	741	Flat Foot.	
4275	741	Eclipting Spring for, per pair	5.00
4276	742	Sayre's Apparatus for, each	12.00
1462	92	Fletcher's Aneurism Needle	3.00
1357	83	Flexible Bullet Forceps, Tiemann's	6.00
1358	83	Bullet Forceps, Weisse's	10.00
2689	306	Director, Silver	1.50
1020	5	Stethoscope	1.25
1035	5	Stethoscope, Arnold's	1.50
1711	126	Flint's Aspirator and Trocar	5.00
1055	8	Cyrtometer	10.00
1050	7	Percussor, Hard Rubber Handle	.75
1050	7	Percussor, Steel Handle	1.00
	18	Physiological Armamentarium	70.00
1046	7	Pleximeter	.35
1711	126	Trocar and Aspirator	5.00
1000	1	Urine Test Apparatus	70.45

FIG.	PAGE.		PRICE.
	2	Flint's Urine Test Extras. Prices on page 2.	
4392	767	Flood's Artificial Leech Glass, each	\$1.25
4372	764	Fluhrer's Aluminium Bullet Probe	4.50
4395	767	Cautery Protector	
4010	621	Crochet Drill	2.00
4011	621	Fork	3.00
4012	621	Grooved Retractor	2.50
		Set for Wiring Bones	18.00
2591	286	Spray Tube	5.00
4126	670	Swinging Cradle	
4013	621	Wire Suture, each	.50
3849	563	Folding Litter	
1530	97	Saw, Lewis'	2.50
2384	238	Tongue Depressor	1.25
2378	238	Tongue Depressor, Green's	2.25
2385	239	Tongue Depressor, Pocket	.75
2383	238	Tongue Depressor, Steel	2.50
3367	474	Uterine Sound	2.50
3787	548	Vectis	3.50
2166	206	Folsom's Nasal Speculum	1.50
2786	324	Truss	20.00
1181	33	Foot Plate Electrode, Flannel-covered	4.00
1231	36	Metallic	.50
3061	399	Forceps, Alligator: Curved Urethral	6.00
2072	193	Noyes' Ear	4.50
3060	399	Straight Urethral	5.50
1348	82	Forceps, Arrow Extracting, Bill's	2.50
		Artery, see Artery Forceps.	
	103	Forceps, Bone Cutting:	
1566	101	Hamilton's Serrated Cutter	10.00
1596	103	Heuel's	3.50
1595	103	Isaac's, Large	7.00
1595	103	Isaac's, Small	4.00
1589	103	Liston's, Best	3.00
1589	103	Liston's, Second	2.50
1594	103	Liston's, Extra Sizes	4.00 to 7.00
1591	103	Liston's, Curved on the Flat	3.50
1592	103	Liston's, Knee Bent	3.50
		Liston's, Knee Bent, Extra Large	4.00 to 7.00
1593	103	Satterlee's, Large	3.00
1593	103	Satterlee's, Small	2.50
1600	103	Velpeau's	4.00
	103	Forceps, Bone Gouging (Rongeur):	
1599	103	Curved	3.50
1597	103	Darby's	4.00
1590	103	Hoffman's	4.00
1620	108	Post's	3.00
1598	103	Straight	3.50
	101	Forceps, Bone Holding:	
1569	101	Farabeuf's Osteophor	7.00
1565	101	Ferguson's Lion-jaw	3.00
1567	101	Ferguson's Lion-jaw	3.00
1568	101	Ferguson's Sequestrum	2.50
1570	101	Hamilton's Osteophor	4.00
1572	101	Hamilton's Sequestrum	2.50
1571	101	Markoe's Sequestrum	3.00
1537	98	Van Buren's Sequestrum	2.50
1444	91	Forceps, Bull-dog: Artery	1.50
1987	175	Extirpation of Eye	2.50
1134	18	Gastric Fistula	2.50
		Forceps, Bullet Extracting, see Bullet Forceps.	
		Forceps, Canulated:	
2066	193	Allen's Aural	4.50
2056	192	Avery's Aural	4.50
2062	192	Bumstead's Aural	4.00
2058	192	Tiemann & Co.'s Aural	4.50
1919	163	Wilde's Ophthalmic	12.00
3388	476	Forceps, Caustic: Gardner's	3.00
3387	476	Sims'	3.50
1773	146	Forceps, Cilia	1.00
1775	146	Cilia, Gruening's	1.75
1776	146	Cilia, Henry's	2.50

FIG.	PAGE.		PRICE.
1774	146	Forceps, Cilia, Piffard's	\$1.50
1481	94	Clamp, Nott's	0.00
3703	528	Clamp, Wells'	8.00
		Craniotomy, see Craniotomy Forceps.	
		Dental, see Dental Forceps.	
1683	121	Depilating, Henry's	2.50
2815	331	Depilating, Henry's	2.50
3302	453	Dilating, Thomas'	3.00
		Dissecting, see Dissecting Forceps.	
		Dressing, see Dressing Forceps.	
		Ear, see Aural: Foreign Body and Polypus Forceps.	
3793	548	Embryotomy, Bachelder's	12.00
3791	548	Embryotomy, Tiemann & Co.'s	3.00
		Entropium, see Entropium Forceps.	
2499	269	Epiglottis Pinsette	4.50
		Epilating, see Epilating Forceps.	
1984	175	Extirpating, Eye	3.00
1130	18	Extirpating, Nerve	2.00
		Eye, see Ophthalmic: Entropium, Enucleation, Epilating, Extirpation, Fixation, Iris and Strabismus Forceps.	
2101	106	Eyelet, Politzer's	1.50
3148	428	Forcippresure	2.50
4022	626	Forcippresure	2.50
1678	120	Grappling, Piffard's	3.00
		Gullet, see Oesophageal Forceps and Throat Forceps.	
		Harelip, see Harelip Forceps.	
		Iris, see Ophthalmic: Cataract, Iris Forceps.	
		Laryngeal, see Laryngeal Forceps.	
1960	163	Lens and Foreign Body	3.00
1771	145	Lid, Carron de Villard's	4.00
2727	310	Ligating, Bodenhamer's	4.50
2724	310	Ligating, Bodenhamer's	4.50
1465	92	Ligature, Wight's	1.75
3141	421	Lithotomy	3.00
3139	421	Lithotomy, Curved	3.00
3140	421	Lithotomy, Little's	3.00
3991	614	Luxation, Charriere's	9.00
3990	614	Luxation, Luer's	8.00
3989	614	Luxation, Plain	4.00
1096	13	Microscopic, Curved	.75
1095	13	Microscopic, Straight	.75
		Midwifery, see Obstetrical Forceps.	
2394	243	Musseau's, Seizing	2.50
		Nail, see Nail Extracting Forceps.	
		Nasal, see Nasal Polypus Forceps, Nasal Septum Forceps.	
		Necrosis, see Rongeur.	
		Needle, see Needle Forceps.	
		Obstetrical, see Obstetrical Forceps.	
3696	526	Pedicle, Wells' Angular	5.00
3697	526	Pedicle, Wells' Straight	5.00
3698	526	Pedicle, Wells' T Shaped	5.00
		Phimosis, see Phimosis Forceps.	
		Pile, see Hæmorrhoidal Clamps.	
3795	548	Placenta	2.50
		Placenta, Bozeman's	3.00
		Placenta, Loomis'	6.00
		See also Embryotomy Forceps.	
1290	76	Polypus	1.50
		See Nasal Polypus Forceps; also Uterine Tumor and Polypus Forceps.	
3610	505	Punching, Thomas'	6.00
		Rongeur, see Rongeur.	
2262	224	Root, Dental	2.00 and 2.75
2263	225	Root, Dental	2.00 and 2.75
3693	525	Sac, Thomas'	3.50
3695	525	Sac, Wells'	4.50

FIG.	PAGE.		PRICE.
3692	525	Forceps, Sac, Wilcox's	\$5.50
		Seizing, see Seizing Forceps.	
		Sequestrum, see Sequestrum Forceps.	
3976	608	Shrimpton's, for Shaping Splints	3.00
2291	227	Splitting, Goodwillie's	2.75
4329	756	Sponge, Cohen's, each	4.00
1877	154	Strabismus, Curved	1.50
1881	154	Strabismus, Straight	1.25
1323	80	Suture, Allis'	2.00
		Tonsil, see Tonsil Forceps.	
		Throat, see Throat Forceps.	
3269	449	Tissue, Thomas'	4.50
2390	239	Tongue, Cusco's	4.50
2389	239	Tongue, Dobell's	4.50
		Tooth, see Dental Forceps.	
		Torsion, see Torsion Forceps.	
2528	276	Tracheal, Tiemann & Co.'s	4.50
2525	276	Tracheal, Trousseau's	2.50
1537	98	Trepanning, Van Buren's	2.50
1772	146	Trichiasis, Ratti's	3.00
		Tumor, see Tumor Forceps, Uterine Tumor and Polypus Forceps.	
		Urethral, see Urethral Foreign Body Extractors.	
2412	246	Universal, Tiemann's	2.50
2262	224	Universal Tooth	2.00 and 2.75
2276	226	Universal Tooth	2.00 and 2.75
		Uterine, see Uterine Dressing Forceps.	
3053	395	Vesical, Thompson's	5.50
3054	395	Vesical, Thompson's	5.50
3055	395	Vesical, Thompson's	5.50
		Vulsellum, see Vulsellum Forceps.	
		Wire Cutting, see Wire Cutter.	
		Wire Twisting, see Wire Twisting Forceps.	
3818	551	Forceps Saw, Van Huevel's	
		Foreign Body, Aural, see Aural; Foreign Body and Polypus.	
2200	213	Hook	1.00
		Laryngeal, see Laryngeal Forceps.	
		Nasal, see Nasal Polypus Forceps.	
		Oesophageal, see Oesophageal and Throat Forceps.	
		Ophthalmic, see Ophthalmic: Foreign Body Instruments.	
		Urethral, see Urethral: Foreign Body Extractors.	
3714	530	Forné's Serre Nœud	
1265	51	Foster's Operating Table	100.00
1268	53	Speculum Holder, with 2 Blades	15.00
3414	490	Vaginal Syringe	4.00
2524	276	Foulis' Artificial Larynx	
1421	87	Four-bladed Pocket Instrument	6.00
	66	Four-fold Pocket Case	21.00
3861	509	Fowler's Antiseptic Ligature Carrier	3.50
3494	491	Bow Pessary	1.75
		Needle Holder	6.00
3481	490	Pessary	1.25
3921	587	Fox's Clavicle Splint	5.00
1688	121	Electrolysis Needle and Holder	3.90
		Head Band	8.00
	576	Fracture:	
3906	582	Apparatus, Buck's Extension	10.50
3885	577	Apparatus, Buck's Suspension	18.00
3952	598	Apparatus for Gun-shot Fracture	10.00 to 25.00
3942	594	Bed, Skinner's	25.00
3917	584	Box	3.00 to 4.00
3961	601	Box, Fry's	6.00
3918	585	Box, Petit's	
3958	601	Cradle, Salter's	20.00
3914	584	Rest, Volkman's Sliding	4.50 to 8.50
	577	Splints, Adaptable Felt. Send for Price List.	

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
	589	Fracture Splints, Arm, Humerus.		608	Fracture of Thigh and Leg :
		Splints, Day's, per set.....\$50.00	3977	608	Byrd's Wire Gauze and Smith's Splint, \$5.00
	580	Splints, Levis', per set.....15.00	3979	609	Cleudinen's Splint.....
3915	584	Splints, Volkman's T.....5.50 to 6.50	3980	609	Hodgen's Suspending Apparatus.....5.00
	591	Fracture, Colles', see also Colles' Fracture Apparatus.	3975	608	Smith's Anterior Splint.....3.00
	605	Fracture, Compound.	3978	609	Suspension Splint.....20.00
3974	607	Fracture, Dressing.		586	Fracture, Passive Motion.
		Extension, see Extension and Counter-Extension.		585	Fracture, Simple.
	587	Fracture of Clavicle :			Fracture, Un-united, see Pseudarthrosis.
3921	587	Fox's Splint.....5.00	2155	205	Frænkel's Nasal Speculum.....3.50
3920	587	Levis' Splint.....5.00	2560	281	Pneumatic Apparatus.....15.00
3922	588	Richardson's Splint.....6.00	2171	208	Rhinoscope.....8.00
3923	588	Sayre's Dressing.	2174	208	Uvula Hook.....2.50
	589	Fracture of Elbow :	2825	335	Frænum Probe and Spatula.....1.00
3930	590	Clark's Splint.....5.00 to 8.00	4184	699	Frame, Stillman's Horizontal.....
3929	590	Hamilton's Splint.....	4183	699	Stillman's Vertical.....
	593	Fracture of Femur :	3415	481	Fraser's Intra-Vaginal Syringe.....3.00
3943	594	Burge's Apparatus.....50.00	3480	490	Frazer's Pessary.....1.25
3946	597	Double Incline Plane.....4.00 to 6.00	4344	759	Freeman's Electrolysis Needle, Large.....5.00
3948	597	Extension Bar.....5.00 to 6.00	4344	759	Electrolysis Needle, Small.....2.00
3952	598	Gun-shot Apparatus.....10.00 to 25.00	2841	339	French or Metric Scale, Steel Gauge.....3.50
3944	595	Lente's Hospital Splint.....18.00	2790	325	Truss, Adjustable, Double.....8.00
3947	597	Liston's McIntyre's Splint.....16.00	2775	322	Truss, Adjustable, Single.....4.50
3950	598	Munger's Splint, Complete.....6.00	2789	325	Truss, Double.....6.00
3942	594	Skinner's Fracture Bed.....25.00	2774	322	Truss, Single, Soft Pad.....4.00 to 5.00
	599	Fracture of Fibula and Tibia :	3181	433	French's Speculum Vaginæ.....1.50
3959	601	Ankle Splints, Left......75 to 1.50	4345	759	Fritzsche's Uterine Dilators, each.....1.50
3960	601	Ankle Splints, Right......75 to 1.50			Bozeman's Reflux Catheter.....5.00
3962	601	Clark's Splint and Cradle.....30.00	3416	481	Frost's Vaginal Douche.....2.50
3956	600	Depuytren's Fibula Splint.....	3961	601	Fry's Fracture Box.....6.00
3957	600	Dressing Splints, set of 5......50	3233	445	Fryer's Self-retaining Speculum.....12.00
3953	599	Hodgen's Splint.....6.00	3231	444	Sims' Speculum Vaginæ.....2.00
3955	600	Raphael's-Pott's Splint.....5.00	1663	118	Transfusion Apparatus.....6.50
3958	601	Salter's Cradle.....20.00	1146	21	Fuller's Pocket Medicine Case, Style 1.....2.75
3954	600	Wackerhagen's Splint.....	1146	21	Pocket Medicine Case, Style 2.....3.00
	590	Fracture of Forearm and Wrist :	1146	21	Pocket Medicine Case, Style 3.....3.50
3932	591	Coover's Splint, each.....1.50	1146	21	Pocket Medicine Case, Style 4.....5.00
3937	591	Interosseous Splint......80 to .70	1146	21	Minim Measure, No. 2......75
3935	591	Left Radius Splint......50 to .80	1146	21	Minim Pipette, No. 1......50
3934	591	Right Radius Splint......50 to .80	1146	21	Vial, No. 3, per dozen......35
3938	592	Smith's Splint.....	1146	21	Vial, No. 4, per dozen......35
3939	592	Smith's Splint.....			Vial Labels, Adhesive, per sheet......03
3936	591	Squire's Forearm Splint.....1.00 to 1.50	2597	287	Fullgraf's Flat Bill Laryngeal Spray.....6.00
3933	591	Stillman's Bracket.....	2186	211	Laryngeal and Posterior Nares Douche.....3.00
3931	591	Tiemann & Co.'s Sling.....4.50	2597	287	Laryngeal Spray, Flat Bill.....6.00
	589	Fracture of Humerus :	2590	286	Laryngo-Tracheal Douche.....6.00
3926	589	Bancroft's Arm Splint.....	2180	210	Nasal Douche.....3.50
3927	589	Condyle and Humerus Splint......75 to 1.25		122	Fumigation Apparatus, Mercurial :
3928	589	Condyle and Humerus Splint, Jointed, 1.00 to 1.50	1695	122	Bumstead's-Lee's Lamp.....3.00
		Dressing for Neck of Humerus.	1696	122	Maury's Apparatus.....12.00
3924	589	Joint Arm Splint.....2.00 to 2.50	1694	122	Van Buren's Apparatus.....2.50
	586	Fracture of Inferior Maxilla :	1694	122	Van Buren's Lamp.....1.50
3919	586	Hamilton's Bandage.....5.00 to 12.00	3786	548	Funis Clamp, Pulling's......40
3902	581	Levis' Metallic Splint......75	2102	196	Furuncle Knife, Buck's.....1.50
	590	Fracture of Olecranon :			
3930	590	Clark's Splint.....5.00 to 8.00	2367	237	Gag, Allingham's.....7.00
3929	590	Hamilton's Elbow Splint.....	2367	237	Annandale's.....7.00
	602	Fracture of Patella :	2374	237	Clover's.....3.50
3972	605	Bacon's Support.....18.00	4332	757	Denhard's.....7.00
3970	604	Boisnot's Splint.....12.00	2347	235	Goodwillie's.....7.00
3968	603	Dennison's Windlass, each.....1.50	2372	237	Goodwillie's Elastic.....3.00
3971	604	Hamilton's Splint.....8.00 to 10.00	2369	237	Mussey's.....7.00
3964	602	Hartshorn's Splint.....7.00	2519	274	O'Dwyer's.....6.00
3966	603	Jointed Splint, with Screw.....2.00 to 2.75	2370	237	Parker's.....2.50
3967	603	Levis' Splint.....6.00	2366	236	Roe's.....2.50
4401	769	Otis-Malgaigne's Hooks.....5.50	2371	237	Weir's.....7.00
3965	603	Splint......80 to 1.25	2322	232	Whitehead's.....12.00
3969	604	Stillman's Brackets.....			See also Lock-Jaw Instruments.
3973	605	Tiemann's Support.....5.50	1155	24	Gaiffe's Battery.....10.00
3963	602	Turner's Splint.....12.00			Battery, Nickel-plated.....12.00
	586	Fracture of Ribs.	1627	109	Gaillard's Bone Drill.....2.50
			1845	151	Galante's Eye Speculum.....4.00

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
1793	147	Galezowsky's Canalicula Dilator.....	\$2.50	1051	7	Gerne's Pleximeter.....	\$2.50
1758	144	Strabismometer.....	6.00	4383	766	Gerster's Chisels.....	
1533	98	Galt's Trephine and Handle.....	4.50	4374	765	Iodoform Duster.....	1.50
1534				4384	766	Mallet.....	.50
		Galvanic Battery, see Battery, Galvanic.		2557	279	Tracheal Tampon.....	18.00
1154	23	Disk, Garratt's, prices on page 23.		4223	756	Tracheal Tampon, Improved.....	18.00
1156	24	Disk, Voltaic Armadillo, prices, p. 24.		4394	767	Getz's Set of Aspirating Trocars.....	8.50
3530	494	Pessary, Cole's.....	2.00	4388	766	Giant Hook (Riesenhaken).....	5.00
1175	32	Pessary, Hanks'.....	1.50	2497	268	Gibb's Laryngeal Ecraseur.....	3.00
1173	32	Pessary, Intra-Uterine.....	1.50	2477	265	Laryngeal Spray.....	3.00
		Pessary, Simpson's.....	1.00	2725	310	Gibson's Ligature Instrument.....	3.00
3533	494	Pessary, Thomas'.....	1.50	3375	474	Gidding's Uterine Sound.....	2.00
	37	Galvano-Cautery.		3748	538	Gilette's Obstetrical Forceps.....	9.50
1232	37	Galvano-Cautery Battery, Dawson's.....	60.00	1802	148	Girard Teulon's Canalicula Instrument.....	8.00
		Galvano-Cautery Electrodes:		2836	337	Girdner's Phimosis Forceps.....	3.50
		Bosworth's Nasal, per set.....	33.00			Glass Brush.....	.25
1234	38	Dawson's Universal.....	35.00	2852	343	Meatoscope, each.....	.50
1236	38	Lincoln's Laryngeal.....	20.00	1048	7	Pleximeter.....	.50
1235	38	Schrøetter's Laryngeal, Complete.....	16.00	1676	120	Pleximeter, Hess'.....	.50
		No. 1, Snare.....	3.50	2921	352	Gleet Syringe, Harrison's.....	3.50
		No. 2, Lancet.....	3.00			See also Urethral Syringe.	
		No. 3, Porcelain Burner.....	3.50	4319	755	Gleitsmann's Laryngeal Dilator.....	8.50
		No. 4, Knife.....	3.00			Rhinoplastos.....	12.00
		No. 5, Voltolini's Knife.....	3.25	3463	488	Globe Pessary, Glass.....	.50
		No. 6, Blunt Cautery.....	3.00	3464	488	Hard Rubber.....	1.00
1233	37	Galvano-Cautery Sling.....	16.00	3464	488	Silver.....	8.00 to 10.00
1687	121	Galvano-Depilator, Dühring's.....	3.00	4208	711	Glove for Paralysis.....	20.00 to 30.00
1688	121	Fox's, Holder and Needle.....	3.90			Gnawing Forceps, see Rongeur.	
1158	25	Galvano-Faradic Battery, Eighteen Cells.....	52.50	1324	80	Goetz's Suture Instrument.....	10.00
1162	27	Twelve Cells.....	40.00		747	Goldberg's Chiropodists' Pocket Set.....	37.00
1160	28	Twenty-four Cells.....	67.50	2902	350	Gonorrhœa Syringe, Buttle's.....	5.00
3388	476	Gardner's Caustic Forceps.....	3.00	2921	352	Harrison's.....	3.50
3389	476	Caustic Holder.....	2.50			See also Urethral Syringes.	
3429	483	Manifold Instrument, Complete.....	12.00	2731	310	Gooche's Canula.....	5.00
3351	470	Uterine Set.....	46.00			Goodell's Speculum.....	7.00
		Gariel's Air Pessary.....	1.50	3596	503	Uterine Dilator, Large.....	10.00
1154	23	Garratt's Electric Disks. Prices on page 23.		3595	503	Uterine Dilator, Small (Ellinger's).....	10.00
1476	93	Garrigue's Serrefin.....	.25	1581	102	Goodwillie's Levator, Curved.....	2.00
1664	118	Transfusion Apparatus.....	4.00	1582	102	Levator, Half Curved.....	2.00
3235	445	Vaginal Depressor.....	2.00	2347	235	Mouth Gag.....	7.00
1131	18	Gastric Fistula Tube, No. 1.....	1.50	2372	237	Mouth Gag, Elastic.....	3.00
1131	18	No. 2.....	2.50	4409	770	Nasal Dilator, Soft Rubber.....	.75
2624	295	Gastro-Mundator.....	8.50	2158	205	Nasal Speculum.....	1.00
		Gauze, Antiseptic, see Antiseptic Surgery		1602	104	Oral Saw.....	3.50
		Materials.		2368	237	Speculum Oris.....	8.00
1291	76	Gay's Open Ring Scissors.....	1.50	2289	227	Spicula Forceps.....	2.00
	69	Pocket Set.....	22.00	2291	227	Splitting Forceps.....	2.75
2574	283	Gedding's Respirator.....	5.00	2349	235	Staphyloraphy Knife.....	1.50
3499	491	Gehrun's Anteversion Pessary.....	.50	2350	235	Staphyloraphy Knife.....	1.50
		Retroversion Pessary.....	.50	2351	235	Staphyloraphy Knife.....	1.50
	56	General Operating.		2346	235	Staphyloraphy Needle, Set in Case.....	12.00
		General Operating Sets:		2379	238	Tongue Depressor.....	2.50
	17	Blackman's.....	136.75	2288	227	Tooth Forceps.....	2.00
	56	Buck's.....	190.00	2290	227	Tooth Forceps.....	2.00
	58	California.....	69.90	2293	228	Tooth Forceps.....	2.00
	60	Hamilton's.....	101.85	2295	228	Tooth Forceps.....	2.00
	58	Little's.....	100.00	2296	228	Tooth Forceps.....	2.00
	58	Markoe's.....	67.45			Gorget (Lithotomy):	
	60	Mott's.....	72.85	3134	421	Blunt.....	2.50
	59	Parker's.....	104.90	3133	421	Bush's.....	4.50
	57	Post's.....	150.95	3131	421	Dowell's, and Staff.....	5.50
	59	Seymour's.....	176.70	3146	423	Hooked.....	3.00
4040	629	Smith's.....	200.00	3135	421	Keyes' Blunt.....	2.50
4041	690	Tremaine's.....	175.00	3132	421	Physick's, Two Blades.....	6.50
	56	Wood's.....	74.55	2997	375	Teale's.....	2.50
	60	Wright's.....	140.00	2640	299	Gorget-Formed Anal Speculum.....	2.00
2551	278	Gendron's Split Trachea Canula.....	8.00	1574	102	Gouge, Bone.....	1.50
1815	149	Gensoul's Cautery Canula.....	3.00	1579	102	Curved, Hand.....	1.50
	713	Genu Valgum, see also Orthopædic.		1621	108	Curved, Hand.....	1.50
	718	Genu Varum, see also Orthopædic.		2111	197	Curved, Hand.....	1.50
1254	46	George's Ether Inhaler.....	3.50	1577	102	Darby's, and Chisels, per set.....	7.00
		German Students' Lamp.....	6.00	1834	150	Ophthalmic, Foreign Body.....	1.50
		Truss, Double.....	4.50	2129	197	Politzer's.....	2.50
2776	322	Truss, Single.....	3.00	2114	197	Schwartz's, Mastoid.....	1.25

FIG.	PAGE.		PRICE.
2115	197	Gouge, Schwartz's, Mastoid.....	\$1.25
2116	197	Schwartz's, Mastoid.....	1.25
2117	197	Schwartz's, Mastoid.....	1.25
1573	102	Szymanowsky's.....	2.50
		Gouging Forceps, see Rongeur.	
3000	376	Gouley's Beaked Bistoury.....	1.50
2998	376	Catheter Staff.....	2.50
3003	378	Cysto Pylometer.....	24.00
2972	364	Dilating Urethrotome, in Case.....	15.00
2940	356	Dilator for Over-distending.....	12.00
3001	376	Director, Arnott's.....	1.50
2945	358	Divulsor.....	12.00
2945	358	Divulsor, in Case.....	14.00
	376	External Urethrotomy:	
3001	376	Arnott's Probe.....	1.50
3000	376	Beaked Bistoury.....	1.50
2998	376	Catheter Staff.....	2.50
2999	376	Tenaculum.....	1.50
2842	389	Guage, English and Metrical.....	3.50
2843			
2878	846	Guides, Whalebone, each.....	.50
2896	348	Guides, Whalebone, each.....	.50
3166	428	Hydro-Hamostat.....	2.50
2940	356	Instrument for Over-distending.....	12.00
3153	425	Lithoclast, Double Lever.....	10.00
3154	426	Lithoclast, Single Lever.....	8.00
3088	404	Lithotrite.....	35.00
2888	347	Meatotome.....	3.00
2219	217	Nasal Clamp.....	5.00
2940	356	Over-Distender.....	12.00
3007	379	Prostatectome.....	40.00
3009	380	Prostatic Gland Dilator.....	16.00
3066	400	Searcher for Stone.....	1.50
2930	354	Sound.....	1.25
	396	Stricture Set, Compact.....	50.00
	396	Stricture Set, Complete.....	109.00
2999	376	Tenaculum.....	1.50
2895	348	Tunnelled Catheter.....	2.50
2939	356	Tunnelled Sound.....	2.50
2956	361	Tunnelled Urethrotome.....	5.00
2956	361	Tunnelled Urethrotome, Improved.....	12.00
2937	355	Whalebone Bougie.....	.50
2938	355	Whalebone Bougie.....	.50
1614	107	Gowan's Excisor.....	24.00
1003	3	Graduated Measure Glass.....	.75
1391	84	Surgical Knife, White's.....	3.00
1008	3	Tube, Analysis.....	1.25
1618	108	Graefe's Circular Saw.....	20.00
	166	Corneal Incision.	
1948	168	Cystotome.....	1.50
1842	151	Eye Speculum.....	2.50
1862	152	Fixation Forceps.....	2.00
1935	165	Iris Forceps.....	1.75
1950	168	Lens Tractor.....	1.75
1898	162	Linear Knife.....	1.50
	180	Set of Eye Instruments.....	46.00
1871	154	Strabismus Hook, Large.....	1.25
1872	154	Strabismus Hook, Small.....	1.25
	121	Grafting, Skin.	
1677	120	Scissors.....	10.00
3470	489	Grally Hewitt's Pessary.....	1.00
3488	490	Pessary.....	1.00
2460	264	Granger's Sponge Holder.....	2.00
2493	268	Grant's Oedema Glottis Instrument.....	1.50
1678	120	Grappling Forceps, Piffard's.....	3.00
1123	16	Hook, Dissecting.....	.60
3210	441	Graves' Speculum Vaginae.....	5.00
2395	243	Green's Double Hook.....	2.50
		Forceps.....	3.00
	124	Hypodermic Case.....	10.00
		Hypodermic Syringe Needle.....	.60
2378	238	Tongue Depressor.....	2.25
2397	243	Tonsil Bistoury.....	2.00
2400	243	Tonsil Hook.....	1.75

FIG.	PAGE.		PRICE.
3659	513	Greenhalgh's Tumor Forceps.....	\$6.00
1801	148	Greenslade's Concealed Canalicula Knife.....	8.00
		Greensville Dowell's, see Dowell's.	
1472	93	Gross' Artery Compressor.....	5.00
3169	428	Artery Compressor.....	5.00
4226	719	Bow Leg Brace (Shoes extra), per pair,	25.00 to 35.00
1361	83	Bullet Forceps.....	2.50
2046	191	Ear Spoon and Hook.....	.75
4034	628	Ear Spoon and Hook.....	.75
2970	364	Exploratory Urethrotome.....	6.00
3041	387	Flexible Catheter.....	2.00
3121	417	Lithotomy Knife, Blizard's American.....	1.75
	68	Pocket Set.....	22.00
	68	Pocket Set, Fine.....	26.00
2197	213	Polypus Forceps.....	2.25
2376	237	Speculum Oris.....	5.00
1437	89	Tourniquet.....	12.00
2946	358	Urethral Dilator.....	14.00
2883	346	Urethrameter.....	20.00
2961	362	Urethrotome, Curved or Straight.....	6.00
2970	364	Urethrotome, Exploring.....	6.00
1996	183	Gruber's Ear Speculum, Hard Rubber, ea.	.50
		Ear Speculum, Hard Rubber, Set of 3,	1.50
2097	196	Ear Scissors.....	4.50
		Polypus Knife, Sickle Shaped.....	1.50
2096	196	Tensor Tympani Instrument.....	2.50
1840	150	Gruening's Electro Magnet.....	12.00
1775	146	Epilating Forceps.....	1.75
2126	197	Mastoid Drainage Tube.....	1.00
	180	Set of Eye Instruments.....	71.00
	339	Guages, or Scales for Urethral Instruments:	
2844	340	American, Van Buren and Keyes....	3.50
2845			
2842	389	English and Metrical Diameter,	3.50
2843			
2841	339	French, or Metric, and English Num-	3.50
		bers, Bumstead.....	
2847	340	Handerson's American, English and	6.00
		French.....	
2848	341	Metric, and Approximate English	3.50
2849			
2846	340	Thomas' Adaptable Metric.....	
4359	763	United States, Wyeth.....	3.50
3807	550	Guarded Blunt Hook and Crotchet.....	4.50
1531	98	Crown Trephine.....	6.00
1531	98	Crown Trephine, with Brace.....	21.00
1622	108	Drills, Bone.....	7.00
3707	529	Gueride's Clamp, Ovariectomy.....	6.00
3428	483	Guernsey's Uterine Elevator.....	1.50
2878	346	Guide, Gouley's Whalebone, each.....	.50
2896	348	Gouley's Whalebone, each.....	.50
3032	386	Keyes' Catheter.....	.75
3033	386	Otis' Catheter.....	1.00
		Otis' Whalebone.....	.75
		Guillotine, see Tonsilotome and Uvulotome.	
		Gullet Forceps, see Oesophageal Forceps	
		and Throat Forceps.	
2305	229	Gum Lancet, Plain.....	1.00
2308	229	Tortoise Shell Handle.....	1.75
1412	86	Tortoise Shell Handle, Slide or Spring	
		Catch.....	1.75
1414	86	Gum Lancet and Tenaculum, Slide Catch.....	2.50
1418	87	Spring Catch.....	2.75
	88	Gunn's Pocket Set.....	20.00
	606	Gun-shot Fracture.	
3952	598	Apparatus for.....	10.00 to 25.00
		Gutta Percha, for Splinting, per lb.	3.00 to 4.00
3147	423	Guyon's Colpeurynter.....	1.50
3147	423	Colpeurynter, with Stopcock.....	2.00
	430	Gynaecological:	
	430	Female Bladder.	
	432	Female Rectum.	
	432	Female Urethra.	

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
430	Gynæcological, Female Organs of Generation:			Hæmorrhoidal Suture Needle:	
438	Ovaries.		2714	309	Half Curved, per dozen \$1.00
434	Uterus. "		2714	309	Straight, per dozen..... .50
432	Vagina.		2706	308	Hæmorrhoidal Syringe, Adam's..... 4.50
440	Gynæcological Instruments, Care in the Ap- plication of.		2705	308	Kelsey's..... 5.50
470	Gynæcologica. Operating and Dressing Sets.		2707	308	O'Neal's..... 5.00
470	Uterine Sets.		2711	308	Hæmorrhoidal Tenaculum, Byrne's Double, 6.00
462	Vesico-Vaginal Fistula Sets.		428	Hæmostatic, after Lithotomy:	
	See the following:		3168	428	Brown's Air Tampon..... 4.00
	Ecraseur.		3167	428	Campbell's Canula, with Cotton In- troductor.....
	Hysterectomy.		3170	429	Canula à Chemise..... 1.50
	Hysterotome.		3166	428	Gouley's Hydro-Hæmostat..... 2.50
	Hystero-Trachelorrhaphy.		3169	428	Gross' Artery Compressor..... 5.00
	Kolpo-Cystotomy.		373	Hæmostatic, after Urethrotomy:	
	Kolpokleisis.		2991	373	Bates' Urethral Hæmostat..... 4.00
	Laparotomy.		2994	374	Hunter's Urethral Tourniquet..... 5.50
	Obstetrical.		2992	373	Otis' Perineal Tourniquet..... 5.00
	Ovariectomy.		2993	373	Otis' Urethral Hæmostatic Tube..... .75
	Perineorrhaphy.			Hæmostatic Forceps, see Artery Clamp Forceps.	
	Pessary.		4377	765	Needle..... .15
	Stone in the Female Bladder.		3310	455	Hagedorn's Needle, per Card..... 3.00
	Urethral and Uro-cystic.			Needle, per dozen..... 1.50	
	Urethra, Female.		3312	455	Needle Holder..... 8.00
	Uterine.		4387	766	Hahn's Artery Forceps..... 2.50
	Vaginal.		2309	230	Hainsby's Cheek Compressor..... 3.00
	Vesico- and Recto-Vaginal Fistula.		1216	35	Hair-Brush Electrode..... 2.50
	Vesico-Vaginal Fistula.		3769	541	Hale's Obstetrical Forceps..... 7.00
1267	53	Gynæpod, Comstock's..... \$20.00	3199	439	Speculum Vaginæ..... 5.00
1267	53	Comstock's, with Speculum..... 25.00	1932	164	Hall's Iris Scissors..... 6.00
2143	201	Hackley's Eustachian Spray..... 6.50	1448	91	Hamilton's Artery Forceps..... 2.50
1071	11	Hæmarumascopie, White's..... 2.50	1566	101	Bone Cutter, Serrated..... 10.00
	308	Hæmorrhoidal.	1629	109	Bone Drills..... 7.00
2720	309	Hæmorrhoidal Artery and Needle Forceps, 2.50	1360	83	Bullet Forceps..... 2.50
		Bougie, see Pile Bougie.	1353	82	Bullet Probe and Director..... 2.50
		Hæmorrhoidal Cautery Irons:	1346	81	Director Probes, per set..... 2.50
2743	312	Set of 2..... 3.00	1283	75	Drainage Tube Carrier..... 5.00
2742	312	Set of 3..... 4.50	1629	109	Drills..... 7.00
2732	311	Smith's Serrated, per set..... 6.00	1388	84	Dry Dissector..... 1.50
		Hæmorrhoidal Clamps:	1389	84	Dry Dissector..... 1.50
		Allingham's Pile..... 12.00	1393	84	Dry Dissector..... 1.50
2746	311	Amussat's Cautey..... 8.00	1394	84	Dry Dissector..... 1.50
2737	311	Ashton's Pile..... 3.00	1060	9	Dynamometer..... 5.00
2733	311	Kelsey's Pile..... 6.50	3929	500	Elbow Splint.....
2710	308	Skene's Hæmorrhoidal..... 6.00	60	General Operating Set..... 101.85	
2734	311	Smith's Pile..... 6.50	2320	231	Harelip Scissors..... 1.50
2735	311	Tiemann's, Ivory Plate..... 6.00	4082	653	Hip-Joint Splint..... 15.00
2739	311	Hæmorrhoidal Ecraseur, Smith's Wire..... 6.00	4083		
		Hæmorrhoidal Ligators:	1580	102	Levator..... 1.50
2730	310	Allingham's Ligature Carrier..... 3.50	1283	75	Ligature Carrier..... 5.00
2724	310	Bodenhamer's Curvilinear Forceps..... 4.50	3919	586	Maxillary Bandage..... 5.00 to 12.00
2727	310	Bodenhamer's Spring Ligating For- ceps..... 4.50	1570	101	Osteophor..... 4.00
			3971	604	Patella Splint..... 8.00 to 10.00
2721	309	Carroll's Knot Tier..... 2.00	68	Pocket Set..... 32.00	
2725	310	Gibson's Instrument..... 3.00	1245	40	Revulsor..... 8.00
2731	310	Gooche's Canula..... 5.00	1572	101	Sequestrum Forceps..... 2.50
2718	309	Lente's Ligature Carrier..... 1.25	1566	101	Serrated Bone Cutter..... 10.00
2728	310	Van Buren's Ligatur..... 7.00	2405	245	Tonsilotome..... 15.00
2723	310	Verona's Winch..... 3.50		Hammer, see Mallet.	
		Hæmorrhoidal (Pile) Needles:		Percussion, see Percussion.	
2717	309	Angular Pile..... 1.00	1116	16	Post Mortem..... 2.50
2713	309	Bush's Pile Needles and Holder..... 3.00	745	Hammer Toe.	
2716	309	Helical..... 1.75	4284	745	Apparatus No. 1, each..... 6.00 to 12.00
2719	309	Hutchinson's Ligating..... 2.50	4285	745	Apparatus No. 2, each..... 7.00 to 15.00
2715	309	Ruptured Perineum..... 1.00	1066	10	Hammond's Æsthesiometer..... 3.00
2722	309	Skene's..... 1.75	4307	753	Hand, Artificial..... 75.00 to 150.00
2729	310	Hæmorrhoidal Pin, for Transfixion..... .25	4306	752	Artificial, Prince's..... 60.00
2708	308	Hæmorrhoidal (Pile) Scissors, Angular..... 1.50		Bones of the, see Osteological.	
2709	308	Bush's..... 1.50	1579	102	Gouge..... 1.50
2712	309	Hæmorrhoidal Suture Forceps, Sims'..... 2.50	1621	108	Gouge..... 1.50
2714	309	Hæmorrhoidal Suture Needle, Curved, per dozen..... 1.00	2111	197	Gouge..... 1.50
			1180	33	Plate Electrode..... 1.50
			1541	98	Trepan..... 2.50

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
2847	340	Handerson's Guage.....	\$6.00			Hegar's Uterine Dilators, Set of 23.....	\$14.00
1741	133	Handy Aspirator, Fitch's.....	5.00	1607	105	Heine's Osteotome.....	300.00
1260	49	Hanks' Antiseptic Spray.....	15.00	2373	237	Heister's Speculum Oris.....	6.00
		Bed Pan.....	2.50	2716	309	Helical Needle, Hemorrhoidal.....	1.75
3633	510	Curette.....	2.00	3838	561	Ruptured Perineum.....	1.75
3320	456	Counter-Pressure Tenaculum.....	2.00	1464	92	Suture and Ligature.....	1.75
1175	82	Galvanic Pessary.....	1.50	1467	92	Helmuth's Ligature Carrier.....	3.50
3517	496	Galvanic Pessary.....	1.50		72	Pocket Set.....	32.00
3424	482	Intra-Uterine Douche Tube.....	1.50	2639	299	Rectal Speculum.....	8.50
		Needle Forceps.....	4.00	3144	423	Sonde à Dard.....	6.00
3691	524	Ovarian Trocar.....	4.50	4196	707	Hemiplegia Apparatus, for one Leg (Shoes extra).....	30.00 to 40.00
4340	758	Perineal Needle.....	1.75	3879	575	Henry's Bandage Shears.....	7.50
3571	490	Rapid Uterine Dilator, Set of 10.....	5.50	2443	260	Bull's Eye.....	9.00
3228	444	Speculum Vaginae.....	13.00	2820	332	Cartilage Scissors.....	5.00
2593	286	Spray Tubes, Laryngeal, each.....	1.00	1683	121	Depilating Forceps.....	2.50
4342	759	Tenaculum, Steel Shank.....	1.75	1776	146	Depilating Forceps.....	2.50
4343	759	Tenaculum and Counterpressor.....	2.00	2815	331	Depilating Forceps.....	2.50
3553	497	Tenaculum Forceps.....	3.00	2832	336	Phimosi Forceps.....	4.50
2544	278	Tracheotome.....	9.00	2819	332	Scrotal Clamp.....	8.00
3570	499	Uterine Dilators, set of 12.....	5.00		315	Hernia.....	
4410	770	Uterine Scissors.....	5.00		315	Hernia, Abdominal.....	
2182	210	Hard Rubber Laryngeal and Posterior Nares Syringe.....	1.25		321	Reduction of.....	
2141	201	Hardy's Chloroform Douche.....	4.00		321	Retention of.....	
	230	Harelip.....				See also Truss.....	
2313	231	Clamp, Prince's.....	3.00		333	Hernia, Humoralis :.....	
2312	231	Clamp, Whitson's.....	3.00	2823	333	Carroll's Orchitis Compressor.....	1.25
2310	231	Forceps, Hutchison's.....	3.00	2821	333	Hawes' Orchitis Compressor.....	8.00
2311	231	Forceps, Parallel.....	9.00	2822	333	White's Orchitis Compressor.....	8.00
2314	231	Forceps, Smith's.....	5.00		328	Hernia, Hypogastric, Perineal, Umbilical and Vaginal.....	
2318	231	Pin, Plastic, per 100.....	.40			See also Abdominal Bandage, Ab- dominal Belt, Abdominal Sup- porter, Umbilical Truss.....	
2319	231	Pin, Removable Point.....	50		315	Hernia, Radical Cure of.....	
2316	231	Pin Conductor, Buck's.....	1.00	2768	318	Agnew's Hernia Instrument.....	6.00
2317	231	Pin Conductor, Post's.....	1.00	2771	319	De Garmo's Hernia Syringe.....	8.00
2315	231	Scalpel.....	.75	2764	317	Dowell's Hernia Needles, each.....	1.00
2321	231	Scissors, Angular.....	1.50	2770	319	Heaton's Hernia Syringe.....	4.00
2320	231	Scissors, Hamilton's.....	1.50	2767	317	Redfern Davis' Hernia Instrument.....	15.00
4229	720	Harris' Bow-Leg Spring, per pair.....	4.00	2769	318	Spanton's Strophotome.....	2.00
3336	464	Counter-Pressure Staff.....	2.00	2772	320	Warren's Hernia Syringe, No. 1.....	35.00
2246	223	Tooth Forceps.....	2.00 and 2.75	2773	320	Warren's Hernia Syringe, No. 2.....	18.00
2247	223	Tooth Forceps.....	2.00 and 2.75	2765	317	White's Hernia Ligator.....	10.00
2248	223	Tooth Forceps.....	2.00 and 2.75	2766	317	Wutzer's Hernia Instrument.....	12.00
2249	223	Tooth Forceps.....	2.00 and 2.75	2755	316	Hernia Director.....	2.00
2250	223	Tooth Forceps.....	2.00 and 2.75	2756	316	Director, Hinged.....	1.50
2254	224	Tooth Forceps.....	2.00 and 2.75	2754	316	Director, Hunter's.....	.75
2255	224	Tooth Forceps.....	2.00 and 2.75	2757	316	Director, Levis'.....	1.50
2256	224	Tooth Forceps.....	2.00 and 2.75	2753	316	Director, Peter's.....	2.00
1714	126	Harris' Wood's Trocar.....	5.00	2758	316	Knife, Cooper's.....	1.75
2913	351	Harrison's Pessary Catheter.....	4.00	2759	316	Knife, Stewart's.....	5.00
3047	390	Pessary Catheter.....	4.00	2764	317	Needle, Dowell's.....	1.00
3011	381	Prostatic Dilators, each.....	1.50	2763	316	Saw.....	2.00
3048	391	Trocar and Canulas.....	11.00	2771	319	Syringe, De Garmo's.....	8.00
2921	352	Urethral Irrigator.....	3.50	2770	319	Syringe, Heaton's.....	4.00
1853	151	Hart's Eye Speculum.....	1.50	2772	320	Syringe, Warren's, No. 1.....	35.00
3964	602	Hartshorn's Patella Splint.....	7.00	2773	320	Syringe, Warren's, No. 2.....	18.00
2471	265	Hartwell's Drop Tube.....	2.25	2762	316	Herniotome, Allis'.....	7.00
3689	521	Harvard Operating Chair.....		2760	316	Warren's.....	6.00
2004	183	Hassenstein's Oscope.....	5.00		316	Herniotomy, for the Relief of Strangulated Hernia.....	
2821	333	Hawes' Orchitis Compressor.....	3.00	2762	316	Allis' Herniotome.....	7.00
1022	5	Hawksley's Stethoscope.....	1.25	2758	316	Cooper's Hernia Knife.....	1.75
1905	163	Hayes' Knife Needle.....	1.50	2755	316	Hernia Director.....	2.00
	73	Hayward's Aseptic Pocket Set.....	21.00	2763	316	Hernia Saw.....	1.50
2496	268	Haywood Smith's Scissors, Laryngeal.....	12.00	2756	316	Hinge Hernia Director.....	1.50
3301	453	Uterine.....	12.00	2757	316	Levis' Hernia Director.....	1.50
4189	701	Head Rest, Torticollis, Wood's.....	5.00	2753	316	Peter's Hernia Director.....	2.00
1137	19	Heart Catheter.....	1.00	2759	316	Stewart's Hernia Knife.....	5.00
	40	Heat and Cold, Application of.....		2760	316	Warren's Herniotome.....	6.00
2751	312	Abdominal Pad.....	8.00	1676	120	Hess' Glass Pleximeter.....	.50
1245	40	Hamilton's Revulsor.....	8.00	1263	50	Heuel's Antiseptic Spray.....	6.00
1244	40	Spinal Ice Bag.....	2.00 to 4.00	4035	628	Aspirating Needle.....	1.25
2603	288	Heat to the Chest, May's Steam Jacket.....	35.00				
2770	319	Heaton's Hernia Syringe.....	4.00				
1587	102	Hebra's Bone Scoop.....	2.50				
2625	296	Hegar's Infusor.....					

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
4025	626	Heuel's Bone Forceps	1733	130	Hospital Aspirator
1596	108	Bone Forceps	3413	479	Bed Pan
4033	627	Bone Scoop and Levator		65	Minor Operating Set
1266	47	Ether Inhaler		66	Pocket Set
4026	626	Hypodermic Syringe	3944	595	Splint, Lente's
1331	80	Needle Forceps	2573	283	Hot Air Bath
1327	80	Pin Conductor	3017	388	Water Bag, Van Buren and Keyes'
4036	628	Pin Conductor	1246	42	Water Bath, Arm, Forearm and Hand,
1286	75	Punch	1247	42	Water Bath, Lower Extremity
4037	628	Punch		41	Water in Surgery
4017	625	Pocket Case, Complete	1626	109	Howard's Bone Drills
4030	627	Probes and Directors	3202	439	Speculum Vaginae
4032	627	Scoop and Spade			Tarnier's Obstetrical Forceps
1660	117	Heurteloup's Artificial Leech, in Case	3592	502	Uterine Dilator
3079	402	Lithotrite and Mallet	3728	532	Howe's Soft Rubber Drainage Tube
3941	593	Hewitt's, Colles' Fracture Splint	4271	740	Hudson's Talipes Equinus Apparatus,
3483	490	Pessary			12.00 to 18.00
3159	427	Staff and Knife	4206	711	Wrist Drop Apparatus
1457	91	Hewson's Torsion Forceps			25.00 to 40.00
1128	18	Hey's Saw	2780	323	Hull's Truss
1539	98	Saw			2.00
1543	98	Saw	4301	750	Humerus, Artificial
3670	515	Hick's, Braxton, Wire Ecraseur			35.00 to 70.00
3671	515	Wire Ecraseur, Modified		589	Fracture of Neck of
		Hick's Cephalotrite		750	Humerus, Un-united Fracture of
		Thermometer, Indestructible Index	4300	750	Smith's Brace for
		Thermometer, Minute			35.00 to 70.00
1019	4	Thermometer, Patent Lens Front	1456	91	Hunter's Artery and Needle Forceps
		Higbie's Speculum	3252	448	Depressor
1736	132	Higgins' Aspirator	1347	81	Director
2756	316	Hinge Hernia Director	2754	316	Director
2060	192	Hinton's Polypus Forceps	2987	371	Divulsor and Urethrotome
2061	192	Polypus Forceps, Double Joint	3245	447	Ehrich's Speculum Vaginae
	687	Hip-Joint, Morbus Coxarius	2879	346	Filamentous Wedge
		See also Orthopaedic: Diseases of the	2579	284	Inhaler
		Joints	3740	537	Obstetrical Forceps
3496	491	Hitchcock's Anteversion Pessary	3495	491	Pessary
3734	536	Hodge's Obstetrical Forceps	3201	439	Speculum Vaginae
	553	Obstetrical Set	3076	402	Trilabe
3473	489	Pessary	2994	374	Urethral Tourniquet
3472	489	Pessary	3582	501	Uterine Dilator
3490	490	Pessary, Closed Lever	3365	474	Uterine Sound
3484	490	Pessary, Horse-shoe			1.25
3953	599	Hodgen's Fracture Splint			1.50
3980	609	Suspending Apparatus	3462	488	Hurd's Pessary, Anteversion
1333	80	Hoff's Automatic Suture			Pessary, Retroversion
1690	103	Hoffmann's Gouge Forceps	2563	281	Hutchinson's Spirometer
1047	7	Pleximeter			32.00
3461	488	Hofmann's Pelvic Pessary	4112	667	Hutchison's Ankle-Joint Splint
2809	329	Supporter, Abdominal	2911	350	Catheter, Ointment, in Case
2416	248	Holbrook Curtis' Post Nasal Forceps	1253	45	Ether Inhaler
1045	7	Holden's Resonator	4072	647	Extension Shoe (Shoes extra)
1319	79	Hollow Needle, Tiemann's	2310	281	Harelip Forceps
3798	549	Holme's Perforator	4069	645	Hip-Joint Splint
2942	357	Holt's Divulsor, in Case	4095	659	Knee-Joint Splint
4101	661	Holthouse's Spiral Spring Extender	2719	309	Ligating Needle
		Hood's Truss	3129	419	Lithotome
		Hook, Aural, see Aural Hook	3402	477	Ointment Syringe, with 1 h. r. Tube
		Blunt, see Blunt Hook	3402	477	Ointment Syringe, with 3 silver Tubes
		Foreign Body, see Foreign Body and	1642	113	Osteotome
		Polypus		17	Post Mortem Set
		Iris, see Ophthalmic, Cataract: Iris	2827	336	Prepuce Forceps
		Hook	1665	119	Transfusion Apparatus
		Strabismus, see Ophthalmic, Strabo-	3040	387	Huter's Flat Catheter
		tomy		334	Hydrocele
		Tenaculum, see Tenaculum	1712	126	Bag and Stopecock
		Tonsil, see Tonsil Hook	1719	126	Trocar and Canula
		Vulsellum, see Vulsellum Hook			See also Trocar
3146	423	Hooked Gorget		214	Hypertrophied Nasal Tissue
4130	675	Hooper's Knee Extension Splint		378	Prostate
3454	487	Hornby's Pessary		123	Hypodermic
2782	323	Horse-shoe Pad Truss, Wood's	1709	125	Hypodermic Needles:
	330	Hose, Elastic, Prices on page 330			Gilt
2084	195	Hosner's Ear Spout			Gold
					Greene's
					Nickel-plated
					Steel
					Hypodermic Syringe and Aspirator
					5.50
					Hypodermic Syringe Bottle, Tiemann's
					.20
					Hypodermic Syringe, Brown's Pocket Case
					2.50
					Kelsey's Hemorrhoidal
					5.50

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
1697	123	Hypodermic Syringe, No. 0	\$3.00			Inhaler, Spray, Steam, Fumes and Vapor :	
1698	123	No. 1	4.00	2589	286	Chapin's Laryngo-Tracheal Spray ...	\$4.50
1699	123	No. 2	3.00	2594	287	Cleborne's Spatula and Atomizer	
1700	123	No. 3	2.50	2595	287	Cleborne's Spatula and Insufflator	8.00
	123	No. 4	2.50	2580	284	Clinton's Atomizer	1.75
1701	123	No. 5	3.00			C. and S. Atomizer	5.00
1702	123	No. 6	3.00	2570	282	Dobell's Residual Air Pump	3.00
		No. 7, Vance's	4.00	2583	284	Edson's Spray Producer	
		No. 8	2.50	2591	286	Fluhrer's Spray Tube	5.00
	123	No. 9	3.00	2597	287	Fullgraf's Flat-bill Laryngeal Spray ..	6.06
1703	124	No. 10	5.00	2590	286	Fullgraf's Laryngo-Tracheal Douche ..	6.00
		No. 11	4.00	2593	286	Hanks' Spray Tubes, each	1.00
		No. 12	4.00	2579	284	Hunter's Inhaler	1.50
1705	124	Nunn's, and Pellet Holder	6.50	2576	283	Mackenzie's Eclectic Inhaler	6.00
2707	308	O'Neal's	5.00	2592	286	Newman's Atomizer	6.00
	125	Repairing of		2575	283	Nicol's Inhaler	5.00
1707	125	Tiemann's Pocket Case	2.50	2577	283	Porter's Croup Kettle	4.50
1704	124	Tyndale's Intra-Pulmonary	5.50	2569	282	Ramage's Inhaler	1.25
	519	Hysterectomy, per Abdominal Section :		2602	288	Richardson's Spray Producer :	
3683	519	Cintrat's Serre Nœud	10.00			3 Hard Rubber Tubes	3.00
3682	519	Curved Needle	1.75			1 Silver Tube	5.50
3684	519	Koeberle's Serre Nœud, Forceps and				3 Silver Tubes	6.50
		Skewer	12.00	2578	283	Roe's Inhaler	2.00
3685	519	Sims' Abdominal Protectors, with 2		2596	287	Sass' Hand Ball Spray Producer	5.00
		Skewers	4.00	2584	285	Sass' Spray Producer, with Receiver	
	516	Hysterectomy, per Vaginam :				and Air Pump	
3678	516	Küchenmeister's Scissors	6.00	2588	286	Sass' Spray Tube and Bottle	
3680	516	Scissors for Amputating Cervix	6.00	2582	284	Seeger's Steam Nebulizer	12.00
3681	517	Thomas' Forceps for Amputating Cer-		2598	287	Spray Tubes and Stand	
		vix	35.00	2581	284	Tiemann's Steam Atomizer	5.00
3679	516	Tooth-edged Scissors, Clark's	9.00	2599	287	Wight's Continuous Spray Apparatus ..	5.00
3686	519	Wilcox's Pin	1.00	2586	285	Wile's Compressed Air Spray Appa-	
3474	489	Hystrophore, Zwank's	1.50			ratus	
	505	Hysterotome, Metrotome, Uterotome :		3043	389	Injection, Bladder, Keyes' Irrigator	5.50
3611	505	Bozeman's Angular Scissors	4.50			See also Double Current Catheters.	
3613	505	Peaslee's Uterotome, with 1 Blade	4.50			Hypodermic, see Hypodermic Syringe.	
3613	505	Peaslee's Uterotome, with 2 Blades	6.50			Rectal, see Rectal Infusor, Injector and	
3609	505	Simpson's Hysterotome	7.00			Irrigator.	
3612	505	Stohlmann's Hysterotome	7.00			Uterine, see Uterine Irrigation, Douching.	
3610	505	Thomas' Uterine Double Scissors	6.00			Vaginal, see Vaginal Syringes.	
3608	505	White's Hysterotome	12.00	289		Injuries and Diseases of the Chest.	
	553	Hystero-Trachelorrhaphy :		631		Insane, Care of.	
3829	557	Cowan's Trachelorrhaphy Forceps	4.00			Restraints for, see Restraints for the	
3824	554	Emmet's Uterine Tourniquet	5.50			Insane.	
4410	770	Hanks' Trachelorrhaphy Scissors	4.00	2193	211	Insufflator, Bridge's Auto	.75
3828	557	Skene's Counterpressor	1.50	2478	286	Clay's Powder	2.00
3826	556	Skene's Hawk-bill Scissors	10.00	4330	756	Cohen's Pharyngeal Powder	2.00
3827	556	Skene's Needle Forceps	5.50	2474	265	Elsberg's Pharyngeal Powder	2.00
3825	556	Skene's Tenaculum Forceps	3.00	2094	195	Knapp's Powder, Aural	1.50
3830	557	Skene's Uterine Sector	11.00	2476	265	Laryngeal Powder	1.50
3831	558	Van de Warker's Needle Forceps	7.00	2433	254	Lefferts' Laryngeal	2.00
3833	559	Von Ramdohr's Needle Forceps	10.00	2432	254	Lefferts' Nasal	4.00
				3792	548	Lusk's, Asphyxia	1.25
				2432	254	Nasal	4.00
1785	146	Ice Bag, Eye, Turnbull's	2.50	2187	211	Powder Tubes, Post Nasal, each	.25
1244	40	Spinal	2.00 to 4.00	2475	265	Rauchfuss' Powder	2.00
		Illuminator, see Endoscope, Laryngoscope,		2704	307	Rectal Powder	2.50
		Ophthalmoscope.		3794	548	Robinson's Asphyxia	1.50
	383	Incontinence of Urine :		2188	211	Robinson's Powder	3.00
3014	383	Urinal, India Rubber	2.50	2142	201	Sexton's Aural	2.00
3015	383	Urinal, India Rubber	6.50	1176	32	Insulated Catheter, Nunn's	4.00
3016	383	Urinal, India Rubber	2.50	1201	34	Urethral and Uterine Electrode	1.25
3445	486	Inflatable Ball Pessary, with Stop-cock	1.00			Internal Urethrotomy, see Urethrotomy, In-	
3442	486	Ring Pessary, without Stop-cock	.50			ternal.	
3443	486	Inflated Pessary	.50	1523	97	Interosseous Saw, Lente's	1.50
	200	Inflation of the Cavity of the Tympanum.		3937	591	Splint	.30 to .70
	303	Infusion.		1173	32	Intra-Uterine Galvanic Pessary	1.50
		Inhaler, Anæsthetic, see Anæsthetic Inhaler.		3530	494	Galvanic Pessary, Cole's	2.00
		Pneumatic, see Pneumatic Apparatus.				Simpson's	1.00
		See also Respirator and Spirometer.		3533	494	Thomas'	1.50
	283	Inhaler, Spray, Steam, Fumes and Vapor :				Intra-Uterine Speculum, see Uterine Spec-	
2587	285	Burge's Air Compressor				ulum.	
2600	288	Burrall's Atomizer	2.25			Intra-Uterine Stem Pessary, see Stem Pes-	
4357	761	Carbon-Dioxide Generator	10.00			sary.	

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
	274	Intubation of the Larynx:	3757	539	Jenks' Obstetrical Forceps, Long.....\$8.50
2519	274	O'Dwyer's Gag.....\$6.00	3756	539	Obstetrical Forceps, Small.....7.50
2521	274	O'Dwyer's Scale......50	3195	437	Speculum Vaginæ.....8.00
	274	O'Dwyer's Set, Complete, in Case.....35.00	3361	473	Uterine Probe.....1.75
2520	274	O'Dwyer's Tube and Obdurator.....3.00			Uterine Scissors.....4.50
2522	274	O'Dwyer's Tube Extractor.....5.00	3371	474	Uterine Sound.....3.50
2520	274	O'Dwyer's Tube Introducer.....5.00			Jennison's Sound.....3.00
		Inversion of Feet, see Orthopædic: Deformi-	1080	12	Jewett's Microscopic Section Cutter.....9.00
		ties of the Feet.	3775	541	Obstetrical Forceps, Aseptic.....10.00
4330	756	Iodoform Duster, Cohen's (Vienna).....2.00	2556	279	Johnson's Double Canula and Obdurator..10.00
4374	765	Gerster's.....1.50	635		Joints:
1930	164	Iricystome, Culbertson's.....16.00			Diseases of the, see Orthopædic: Dis-
	160	Iridectomy.			eases of the Joints.
	160	Iridodialysis.			Dislocation of the, see Dislocation
1686	121	Irido-Platinum Needle, Piffard's.....1.00			and Luxation.
	160	Iridotomy.			Resection and Exsection of, see Os-
		Iris, see Ophthalmic: Cataract, Iris.			teotomy: Resection and Exsec-
		Iron Suture Wire, per coil......02			tion
3043	389	Irrigator, Bladder, Keyes'.....5.50			Jones Artery Clamp Forceps.....2.50
		See also Double Current Catheter.			Articulated Scissors.....2.50
		Irrigator, Nasal, see Nasal Douche.			Ecraseur.....15.00
		Rectal, see Rectal Injectors, Irri-	3181	475	Uterine Dressing Forceps.....6.00
		gators.	1258	48	Junker's Methylene Inhaler.....12.50
		Uterine, see Uterine Irrigation,	1657	116	Junod's Arm.....25.00
		Douching.	1656	116	Boot.....25.00
		Vaginal, see Vaginal Syringe.	4142	684	Jury Mast, Sayre's.....12.00
3850	564	Wound, Esmarch's.....4.50			
3854	567	Wound, Wyeth's.....4.00			Kæmmerer's Uterine Sounds, 4 in Set.....6.00
1595	103	Isaac's Bone Forceps, Large.....7.00	3206	441	Keene's Speculum Vaginæ.....7.00
1595	103	Medium.....5.00	2558	279	Trachea Tube.....6.50
1595	103	Small.....4.00	3719	530	Keith's Clamp, Ovariectomy.....10.00
	78	Ishiguro's Whale Tendon Ligature, per coil,.40	3716	530	Compressing Forceps, 2 Sizes, 3.00 and 4.00
3758	539	Ives' Obstetrical Forceps.....7.00	3725	531	Drainage Tube......75
1049	7	Ivory Pleximeter.....1.00	4349	759	Ligature Forceps.....1.50
1014	4	Scale Axilla Thermometer.....2.50	3730	533	Needles, each......10
			3142	423	Tenaculum.....1.25
4165	692	Jacket, Felt.....25.00			Kelly's Powder Blower.....3.00
4174	696	Sayre's Plaster.....	3396	476	Silver Uterine Syringe.....5.00
4049	631	Straight, Long.....10.00	2694	307	Kelsey's Applicator......75
4049	631	Straight, Short.....8.00	2678	306	Fistula Knife.....2.50
3074	401	Jacobson's Lithotrite.....30.00	2705	308	Hæmorrhoidal Syringe.....5.50
3075			2733	311	Pile Clamp.....6.50
	74	Jaconet, Carbolized, per yard.....	2681	306	Proctotomy Knife.....1.75
1887	162	Jæger's Angular Keratome.....1.75	2657	301	Rectal Bougie, Soft Rubber.....1.50
1800	148	Bistoury Caché.....8.00	4346	759	Rectal Retractor.....3.50
1864	152	Ophthalmostate.....8.00	2638	299	Rectal Speculum.....6.00
1770	145	Plate Lid Holder, Hard Rubber.....1.00	2691	307	Scoop, for Impacted Fæces.....2.50
1770	145	Plate Lid Holder, Tortoise Shell.....2.00	2738	311	Tumor Forceps.....2.50
1888	162	Straight Keratome.....1.50			Keratome, see Ophthalmic, Cataract: Ke-
		Jaque's Catheter.....1.00			ratome.
3031	386	Tiemann's Velvet Eyed......75			162 Keratotomy.
2228	219	Jarvis' Excisor.....5.00			174 Keratonyxis.
2220	218	Fenestrated Cartilage Forceps.....4.50	2577	283	Kettle, Croup.....4.50
2482	266	Laryngeal Applicator.....10.00	228		Key, Dental (Turn Key):
2222	218	Nasal Rongeur.....4.50	2299	228	Removable Fulcrum.....2.50
2227	219	Nasal Septum Forceps (Punch).....8.50	2300	229	Rotating Fulcrum.....2.50
2162	206	Nasal Speculum......75	2298	228	Spring Bolt.....3.00
2161	206	Nasal Speculum, Operating.....3.00	2297	228	Spring Bolt, Double.....3.00
2229	220	Rhinometer.....9.00	3043	389	Keyes' Bladder Washer.....5.50
2168	208	Rhinoscopic Mirror and Tongue De-	3032	386	Catheter Guide......75
		pressor.....4.00	4339	758	Cutaneous Punch.....2.50
2227	219	Steele's Septum Forceps.....8.50	4362	763	Device for Vesical Drainage.....2.00
2169	208	Tape Holder......75	3107	412	Evacuating Tube, Curved.....9.00
2206	214	Transfixion Needle......75	3106	411	Evacuating Tube, Straight.....8.00
2221	218	Trimming Scissors.....9.00	3135	421	Gorget, Blunt.....2.50
2205	214	Wire Snare, Ecraseur.....3.00 and 4.00	3043	389	Irrigator.....5.50
		Wire Snare with Curved and Straight	3109	412	Lithotrite, Large.....35.00
		Ends.....5.00	3108	412	Lithotrite, Small.....35.00
		Jaw, Fracture of, see Fracture of Inferior			on Hydrocele.
		Maxilla.	4361	763	Perineal Retractor.....2.50
		Lock, see Lock-Jaw Instruments.			Pocket Set.....23.00
2568	282	Jeffrey's Respirator for Mouth.....2.50	4411	770	Stone Searcher.....
2568	282	Respirator for Mouth and Nose.....3.00			Stop-cock, Two Way.....2.50

FIG.	PAGE.		PRICE.
4364	768	Keyes' Tube for Supra-Pubic Vesical Drainage, with Urinal	\$6.00
4368	764	Ultzman's Syringe	6.00
2824a	334	Varicocele Needle	1.75
2824b	334	Varicocele Needle	1.75
		Varicocele Needle, Improved	6.00
4363	763	Kiefer's Urethral Irrigation Nozzle	1.50
3227	444	King's Pelvimeter	4.00
3526	493	Kinloch's Anteversion Pessary	1.25
3525	493	Polypus Vesicæ Pessary	2.50
3543	495	Retroflexion Pessary	2.00
3544	495	Retroflexion Pessary	1.25
2968	363	Urethrotome	25.00
4366	764	Klotz's Endoscope	3.50
1965	172	Knapp's Capsulotome	1.75
1817	149	Caustic Holder	1.00
1885	159	Caustic Holder	1.00
1964	171	Cystotome (Needle)	1.75
2124	197	Drainage Tube	.75
2125	197	Drainage Tube	.75
2003	183	Ear Specula, Plated, Set of 3	3.00
2003	183	Ear Specula, Silver, Set of 3	4.50
1760	145	Entropium Forceps	4.00
1829	150	Foreign Body Hook	2.00
1838	150	Foreign Body Hook	2.00
1826	149	Lachrymal Syringe	4.00
1964	171	Needle Cystotome	1.75
1781	146	Needle Holder	3.50
1749	140	Ophthalmoscope, Double Disk	35.00
1752	143	Ophthalmoscope, Metric System	32.00
1743	134	Ophthalmoscope, Single Disk	20.00
1269	54	Operating Chair	70.00
2094	195	Powder Blower	1.50
1965	172	Scalpel Needle	1.75
	180	Set of Eye Instruments	73.75
	672	Knee, Anchylosis Apparatus.	
		See also Orthopædic: Diseases of the Joints.	
1156	24	Knee Band, Voltaic	2.25
	330	Cap, Elastic, Prices on Page 330.	
		See also Fracture of Patella.	
4085	654	Compressor, Sayre's	6.00
	653	Joint, Diseased, see also Orthopædic: Diseases of the Joints.	
		Knife, Amputating, see Amputating Knives.	
1110	15	Brain	1.50
1491	95	Cartilage	1.50
1492	95	Cartilage	2.00
		Cataract, see Ophthalmic, Cataract: Keratome.	
		Iris, see Ophthalmic, Cataract: Iris Knife.	
		Lithotomy, see Lithotomy Knife, Lithotome.	
		Mastoid, see Mastoid Process Knife.	
		Microscopic, see Microscopic Section Knife.	
1139	19	Nerve	1.50
		Uterine, see Uterine Knife.	
1043	6	Knight's Stethoscope	7.50
		Knock Knee, see Genu Valgum.	
2872	345	Knotted Bougie	1.25
2721	309	Knot Tier, Carroll's	2.00
2411	246	Knox's Uvulotome	6.50
2834	336	Phimosis Forceps	4.00
3684	519	Koeberle's Serre Nœud, Forceps and Skewer, with Cap	12.00
	464	Kolpo-Cystotomy:	
3338	465	Bache Emmet's Fistula Tube	.30
3337	464	Emmet's Cystitis Eyelet	.25
3336	464	Harris' Counter-pressure Staff	2.00
3339	465	Skene's Urinal Cup Pessary	2.50
	562	Kolpoplexis.	
2628	296	Korup's Infusor	

FIG.	PAGE.		PRICE.
2007	184	Kramer's Ear Speculum, Plated	\$1.75
2007	184	Ear Speculum, Steel	2.50
2077	194	Ear Syringe, Metal	4.50
2077	194	Ear Syringe, with Stopcock	5.50
2133	199	Eustachian Catheter Holder	3.50
3678	516	Küchenmeister's Scissors	6.00
1339	81	Küster's Swan Needle Holder	3.50
		Kyllosis, see Orthopædic: Deformities of the Feet.	
		Kystotome, see Cystotome.	
	430	Labia.	
3180	433	Speculum	2.00
		Lachrymal, see Ophthalmic: Lachrymal.	
2912	351	Lallemand's Porte Caustique, Urethral	4.50
3406	477	Porte Caustique, Uterine	4.50
2634	298	Lamp, Bodenhamer's Reflector and Lens	20.00
1695	122	Bumstead's-Lee's	3.00
2447	261	Collin's	7.00
2443	260	Henry's Bull's Eye Illuminator	9.00
1695	122	Lee's-Bumstead's	3.00
2440	259	Mackenzie's Light Concentrator	7.50
1696	122	Maury's Mercurial Fumigation	12.00
2446	261	Pocket Illuminator	4.50
2451	263	Roe's Laryngoscope	45.00
2448	262	Seeger's Laryngoscope	34.00
2437	257	Tobold's Laryngoscope and Lamp	30.00
1694	122	Van Buren's Mercurial Fumigation	2.50
1419	87	Lancet, Abscess	.75
		Gum, see Gum Lancet.	
		Phlebotomy, see Phlebotomy Lancet.	
		Spring, see Spring Lancet.	
		Thumb, see Thumb Lancet.	
		Vaccinating, see Vaccinating Lancet.	
1846	151	Landolt's Eye Speculum	4.00
1556	100	Lange's Retractor	3.00
		Trachea Tampon	18.00
		Tracheotomy Set	60.75
		Langenbeck's Artery Forceps	1.50
1434	89	Bandage Clamp	1.50
1588	102	Bone Hook and Levator	1.75
2353	236	Cheek Retractor	2.50
1560	100	Retractor, Blunt	2.50
1561	100	Retractor, Sharp	2.50
2399	243	Seizing Forceps	2.50
2326	232	Seizing Forceps	2.50
1477d	93	Serrefin	.50
2542	277	Tracheotome	4.00
2539	277	Tracheotomy Blunt Hook	1.50
2541	277	Tracheotomy Double Hook	3.00
	236	Uraniscoplastic Instruments:	
2354	236	Double Edged Knife	2.50
2355	236	Double Edged Knife	2.50
2356	236	Double Edged Knife	2.50
2359	236	Concave Edged Knife	2.00
2357	236	Convex Edged Knife	1.75
2363	236	Retractor	2.50
2358	236	Slightly Concave Knife	1.75
2326	232	Seizing Forceps	2.50
2361	236	Suture Holder	3.00
2360	236	Tenaculum	1.50
1933	164	Lanne's Forceps Needle, Iris	4.50
	520	Laparotomy.	
4375	765	Large Blunt Hook	3.00
		See also Retractor.	
	250	Laryngeal.	
		Laryngeal Applicators and Brushes:	
2459	264	Child's Brush and Caustic Holder	2.50
2482	266	Jarvis' Applicator	10.00
2467	264	Lefferts' Brush Holder	2.50
2481	266	Lente's Probe	1.25
2458	264	Mackenzie's Brushes, each	1.50
2463	264	Noyes' Brush Holder	2.25

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
Laryngeal Applicators and Brushes:				Laryngeal Sponge Holders:			
2466	264	Ruppaner's Brush Holder	\$1.00	2461	264	Buck's	\$1.25
2462	264	Seeger's Brush Holder	2.50	2464	264	California	2.00
2465	264	Wagner's Brush Holder and Brushes	2.50	2469	265	Elsberg's	6.00
		See also Laryngeal Powder Blowers, and Laryngeal Sponge Holders.		2457	264	Finger	1.50
2515	272	Laryngeal Catheter, Schroetter's	3.00	2460	264	Granger's	2.00
2480	266	Caustic Carrier, Concealed	2.50	2468	265	Mackenzie's, with Safety Wedge	6.00
2502	269	Curette	3.00	2463	264	Noyes'	2.25
4331	756	Curette, Cohen's, each	2.50	2462	264	Seeger's, and Brush Holder	2.50
4327	756	Dilator, Cohen's	10.00	2477	265	Laryngeal Spray, Gibb's	3.00
4319	755	Dilator, Gleitsmann's	8.50	2470	265	Syringe, Hard Rubber	1.25
2512	271	Dilator, Mackenzie's	20.00	2472	265	Syringe, Tobold's	2.50
2517	273	Dilator, McSherry's, with Tube	16.00	2442	259	Laryngoscope, Baber's Pocket	7.50
2514	272	Dilator, Navratil's		2447	261	Collin's Lamp	7.00
2495	268	Dilator, Whistler's, per set	18.00	2445	260	Elsberg's Pocket	6.00
2471	265	Drop Tube, Hartwell's	2.25	2443	260	Henry's Bull's-Eye	9.00
2497	268	Ecraseur, Gibb's	3.00	2440	259	Mackenzie's Light Concentrator	7.50
1206	84	Electrode	1.50	2446	261	Pocket Illuminator	4.50
1207	84	Electrode	1.50	2444	260	Pomeroy's	7.00
1204	84	Electrode	1.00	2451	263	Roe's-Tobold's	45.00
		Electrode, Bosworth's Set	33.00	2438	258	Schroetter's	6.50 to 8.00
2498	260	Electrode, Mackenzie's	3.50	2448	262	Seeger's-Tobold's	84.00
Laryngeal Forceps:				2441	259	Simrock's, with Mirror	9.00
2499	269	Brun's Epiglottis Pincette	4.50	2435	257	Tiemann's, with Head Band	7.00
2510	270	Buck's Throat	2.50	2437	257	Tobold's Large (Lamp extra)	24.00
2508	270	Burge's Throat	4.50			Tobold's Pocket	15.00
4329	756	Cohen's Sponge, each	4.00			Use of the	
2469	265	Elsberg's Throat	6.00	2439	258	Laryngoscopic Mirrors, each	1.25
2503	269	Fauvel's	4.00			Mirrors, Universal Handle, per set	5.50
2506	270	Fauvel's Throat	6.00	2450	262	Set, Lefferts'	26.00
2486	267	Mackenzie's Forceps, Scissors and Ecraseur	25.00			Set, Lefferts' (List of Contents)	26.00
2511	270	Mackenzie's Antero-Posterior	2.75			Set, No. 1	12.00
2509	270	Mackenzie's Lateral	2.75			Set, No. 2	18.00
2507	270	Mathieu's Throat	6.00			Set, No. 3	23.00
2500	269	Noyes' Throat	4.50			Set, No. 4	26.00
2494	268	Rumbold's Forceps and Scissors	4.50	271		Laryngoscopy, Infra Glottic	
2501	269	Simrock's	4.50	271		Laryngo-Tracheal Stenosis:	
2504	269	Tiemann's Flexible	4.50	3512	271	Mackenzie's Laryngeal Dilator	20.00
		Waxham's	5.00	2514	272	Navratil's Laryngeal Dilator	
Laryngeal Knife, see Laryngeal Lancet.						O'Dwyer's Intubation Set, Adult	45.00
Laryngeal Lancets:						O'Dwyer's Intubation Set, Infant	35.00
2493	268	Grant's (Edema Glottis Instrument)	1.50	2515	272	Schroetter's Laryngeal Catheter	3.00
2485	267	Mackenzie's, 2 Blades	12.00			See also Laryngeal Dilator	
2483	267	Mackenzie's, 3 Blades	14.00			Larynx, Artificial:	
2484	267	Schroetter's Lancet and Forceps	15.00	2524	276	Faulis' Modification of Gussenbauer's Apparatus	
2487	267	Tobold's Concealed	4.00	2523	275	Park's Modification of Gussenbauer's Apparatus	
2490	268	Tobold's Knife	1.50	4331	756	Larynx Curette, Cohen's, each	2.50
2491	268	Tobold's Knife	1.50			Larynx, Intubation of:	
2492	268	Tobold's Knife	1.50			O'Dwyer's Complete Set, in Case	35.00
2495	268	Whistler's Cutting Dilators	18.00	2519	274	Mouth Gag	6.00
Laryngeal Mirror, see Laryngoscopic Mirror.				2521	274	Scale of Lengths for Tubes	.50
Laryngeal Powder Blowers:				2520	274	Tube and Obdurator	3.00
2478	266	Clay's Insufflator	2.00	2522	274	Tube Extractor	5.00
2474	265	Elsberg's Insufflator	2.00	2520	274	Tube Introducer	5.00
2476	265	Hard Rubber	1.50	255		Larynx, Organ of Voice	
2473	265	Leffert's Powder Blower	2.00	Lateral Curvature of the Spine, see Scoliosis.			
2433	254	Leffert's Insufflator	2.00	1765	145	Laurence's Eyelid Tourniquet	3.00
2475	265	Rauchfuss', with Mouth-Piece	2.00	1759	144	Strabismometer	2.25
2481	266	Laryngeal Probe, Lente's	1.25			Lavage, see Stomachal.	
2456	264	Mackenzie's, each	1.25	2855	343	Laveur's Endoscope	20.00
Laryngeal Scissors:				3404	477	Lawson's Applicator	4.00
2496	268	Haywood Smith's	12.00			Lawson Tait's, see Tait's.	
4317	755	Sherwell's	14.00	3355	473	Leadene Uterine Probe	.40
4318	755	Sherwell's	7.00	1576	102	Lead Mallet for Osteotomy	2.50
2488	267	Tiemann & Co.'s	8.50	1693	122	Lebenswecker, Baunscheidt's	2.50
2489	267	Tobold's	6.00	1660	117	Leech, Artificial, Heurteloup's	8.00
2494	268	Laryngeal Scissors and Forceps, Rumbold's, Scoop, Tiemann's	6.00	1661	117	Reese's Uterine	4.50
2505	269	Snare, O'Dwyer's	3.50	1659	116	Tiemann's Patent	7.00
4407	770			4392	767	Leech Glass, Flood's, each	1.25
						Leeching	
				1695	122	Lee's Lamp, Modified by Bumstead	3.00

FIG.	PAGE.		PRICE.
2420	251	Lefferts' Compressed Air Spray Apparatus, \$	
2450	262	Examination Case.....	26.00
	256	Examination Case (List of Contents),	26.00
2467	264	Laryngeal Brush Holder.....	2.50
2433	254	Laryngeal Insufflator.....	2.00
2432	254	Nasal Powder Insufflator.....	4.00
2417	249	Nasal Spray Apparatus.....	4.00
2418	249	Nasal Syringe.....	3.00
2419	250	Palate Hook.....	2.00
2415	248	Post Nasal Curette.....	2.50
2414	248	Post Nasal Forceps.....	4.50
2473	265	Powder Blower.....	2.00
		Lenneker's Knife, Right and Left, each	2.00
		Lens, see Ophthalmic : Cataract.	
2481	268	Lente's Caustic Probe.....	1.25
3392	476	Double Bulb Probe.....	1.75
1248	43	Ether Inhaler, Modified.....	3.50
3944	595	Hospital Splint.....	18.00
1523	97	Interosseous Saw.....	1.50
2718	309	Ligature Carrier.....	1.25
3403	477	Ointment Syringe.....	4.50
3407	477	Ointment Syringe.....	8.00
1692	122	Platina Cup.....	3.50
3393	476	Platina Cup.....	3.50
1546	98	Lenticular Knife.....	1.50
1545	98	Knife and Trepanning Elevator.....	1.75
3200	439	Leonard's Speculum Vaginae.....	6.00
3436	485	Uterine Repositor.....	11.00
3370	474	Uterine Sound.....	5.50
3368	474	Uterometric Sound.....	3.25
3062	399	Leroy d'Etiolle's Articular Urethral Curette	12.00
2876	345	Filiform Bougies, each.....	.50
1581	102	Levator, Goodwillie's Curved.....	2.00
1582	102	Goodwillie's Half Curved.....	2.00
1580	103	Hamilton's.....	1.50
1588	102	Langenbeck's, and Hook.....	1.75
3077	402	Lever Lithotrite.....	25.00
2618	293	Stomach Pump.....	16.00
1912	163	Levi's Cataract Needle.....	1.25
1967	173	Cataract Needle.....	1.25
1795	147	Lacrymal Probe.....	2.00
1959	168	Lens Spoon, Fenestrated.....	1.50
1795	147	Probe.....	2.00
3920	587	Levis' Clavicle Splint.....	5.00
3987	614	Dislocation Splint.....	1.50
3912	588	Extension Fulcrum.....	3.50
3912	588	Extension Fulcrum and Weights.....	5.00
2757	316	Hernia Director.....	1.50
3897			
TO	580	Metallic Splints, Set of 21.....	15.00
3905			
3967	603	Patella Splint.....	6.00
2833	336	Phimosis Forceps.....	3.50
3664	514	Levret's Double Canula.....	6.00
1530	97	Lewis' Folding Saw.....	2.50
2816	332	Varicocele Clamp.....	4.00
1769	145	Lid Compressor, Stoke's.....	3.00
1771	145	Forceps, Carron de Villard's.....	4.00
		See also Ophthalmic : Palpebral.	
1770	145	Plate, Jaeger's, Hard Rubber.....	1.00
1770	145	Plate, Jaeger's, Tortoise Shell.....	2.00
1777	146	Scalpel.....	1.50
1778	146	Scalpel.....	1.50
1779	146	Scalpel.....	1.50
1780	146	Scarificator, Desmarre's.....	1.50
1848	151	Liebold's Eye Speculum.....	2.50
1822	149	Subpalpebral Syringe.....	1.50
1850	151	Liebreich's Eye Speculum.....	2.50
1938	165	Iris Forceps.....	6.50
1899	163	Linear Knife.....	1.50
1742	134	Ophthalmoscope.....	4.50
1742	134	Ophthalmoscope, Extra Fine.....	7.50
1811	148	Probe and Fistula Knife.....	2.00
1145	19	Lifting-Back Saw, Large.....	4.00

FIG.	PAGE.		PRICE.
1525	97	Lifting-Back Saw, Medium.....	\$3.00
1522	97	Small.....	2.50
2730	310	Ligator, Allingham's Carrier.....	3.50
2724	310	Bodenhamer's Curvilinear Forceps.....	4.50
1458	92	Carroll's Knot Tier.....	2.00
3666	515	Cintrat's.....	2.50
2725	310	Gibson's, in Anal Fistula.....	3.00
2731	310	Gooche's Canula.....	5.00
3664	514	Levret's Double Canula.....	6.00
2728	310	Van Buren's.....	7.00
2723	310	Verona's Winch, Hemorrhoidal.....	3.50
		See also Artery Needles.	
3862	509	Ligature, Catgut, Am Ende's.....	1.00
		Catgut, American, per bottle.....	.50
		Catgut, English, per bottle.....	.75
		Catgut, Dry, per coil.....	.25
		Dittel's Elastic, per yard.....	.25
		Hard Ash.....	.10
		Hemp.....	.05
		Iron Wire.....	.02
1310	78	Satin Silk, per skein.....	.15 to .70
		Satin Silk, per spool.....	.50
		Satin Silk, 1 size on card.....	.40
		Satin Silk, 4 sizes on card.....	.75
1311	78	Silk, Black Iron-Dyed, per reel.....	.10
		Silk, Chinese Bead, White or Black,	
		per skein.....	.25
1312	78	Silk, Closely Twisted, per skein.....	.35
		Silk, Ordinary, per reel.....	.10
		Silk, Ordinary, per skein.....	.05
		Silkworm Gut, per coil.....	.05
		Silver Wire, per coil.....	.50
	78	Whale Tendon, per coil.....	.40
		Ligature Carrier, see Ligator.	
		Ligature Carriers (Reels and Bottles):	
3862	509	Am Ende's.....	1.00
3861	509	Fowler's.....	3.50
4863	509	Spools and Jar.....	.75 to 1.50
4397	769	Ware's.....	1.50
4397	769	Ware's, Hospital Size.....	3.00
		Lilliputian Pocket Case.....	26.00
1236	38	Lincoln's Laryngeal Cautery Electrode.....	20.00
1903	162	Linear Knife, Baader's, Left.....	1.75
1902	162	Baader's, Right.....	1.75
1898	162	Graefe's.....	1.50
1899	162	Liebreich's.....	1.50
1900	162	Noyes'.....	1.50
1578	102	Linhardt's Knife Chisel.....	1.50
3957	600	Lining Splints, Set of 5.....	.50
		Lint, per pound.....	1.00
1355	82	Lint Carrier (Porte Mèche).....	.75
	506	Lister's Method of Antiseptic Dressing.	
		See also Antiseptic Surgery Materials.	
1499	95	Liston's Amputating Knife, Long.....	4.50
		Amputating Knife, Medium.....	3.50
1497	95	Amputating Knife, Small.....	2.50
1502	96	Aseptic Amputating Knife, Long.....	5.00
1503	96	Aseptic Amputating Knife, Medium.....	4.00
1504	96	Aseptic Amputating Knife, Small.....	3.00
1589	103	Bone Forceps.....	2.50 and 3.00
1594	103	Bone Forceps, Large.....	4.00 to 7.00
1591	103	Bone Forceps, Curved on the Flat.....	3.50
1592	103	Bone Forceps, Knee Bent.....	3.50
3947	597	McIntire's Splint.....	16.00
	425	Lithoclasts (Stone Crushers):	
3156	426	De Rigal's Stone Holder, Perforator	
		and Breaker.....	60.00
3152	425	Dolbeau's Lithoclast.....	7.00
3151	425	Dolbeau's Guide for Lithoclast.....	3.50
3153	425	Gouley's Lithoclast, Double Lever.....	10.00
3154	426	Gouley's Lithoclast, Single Lever.....	8.00
3155	426	Maisonneuve's Stone Crusher.....	20.00
	406	Litholapaxy.	
		See also Lithotrite and Lithotripsy.	

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
	413	Lithotomy.		405	Lithotriety, Débris Evacuators:		
3112	415	Anklets, Peter's.....	\$15.00	3102	409	Bigelow's Latest.....	\$30.00
3111	415	Anklets and Wristlets, Pritchard's ..	8.00	3099	407	Bigelow's Original	12.00
3145	423	Aponeurotome.....	2.00	3100	407	Bigelow's Original, with Stand	16.00
3137	421	Bisector, Wood's.....	4.50	3093	405	Clover's Apparatus.....	14.00
3114	417	Bistoury, Little's.....	1.75	3091	405	Cornay's Washing Bottle.....	25.00
3124	419	Bistoury, Wyeth's.....	2.00	3107	412	Keyes' Evacuating Tube, Curved....	9.00
3127	419	Bistoury Caché, Depuytren's.....	24.00	3106	411	Keyes' Evacuating Tube, Straight ..	8.00
3147	423	Colpeurynter, Guyon's-Peterson's.....	2.00	3092	405	Mercier's Washing Bottle.....	
3113	417	Director, Little's.....	1.50	3090	405	Nelaton's Apparatus.....	30.00
		See also Lithotomy Staff.		3103	410	Otis' Evacuator.....	30.00
3139	421	Forceps, Curved.....	3.00	3103	410	Otis' Evacuator, without Basket.....	25.00
3140	421	Forceps, Little's.....	3.00	3101	408	Thompson's Evacuator.....	15.00
3141	421	Forceps, Straight.....	3.00	3089	405	Van Buren's Catheter and Bag.....	7.00
		See also Lithoclast.		3105	411	Walker's Evacuator.....	22.00
3134	421	Gorget, Blunt.....	2.50	3104	411	Weiss'-Thompson's Evacuator.....	30.00
3133	421	Gorget, Bush's.....	4.50	424	Lithotriety, Perineal, Dolbeau's Operation:		
3131	421	Gorget, Dowell's, and Staff.....	5.50	3149	425	Dolbeau's Dilator.....	24.00
3146	423	Gorget, Hooked.....	3.00	3151	425	Dolbeau's Guide for Lithoclast.....	3.50
3135	421	Gorget, Keyes'.....	2.50	3152	425	Dolbeau's Lithoclast.....	7.00
3132	421	Gorget, Physick's, Two Blades.....	6.50	3150	425	Guyon Duplay's Dilator.....	45.00
3168	423	Hæmostat, Brown's Air Tampon	4.00			See also Lithoclasts.	
3170	429	Hæmostat, Canula à Chemise.....	1.50	3849	563	Litter, Folding.....	
3167	428	Hæmostat, Campbell's Canula.....		1386	84	Little's Aneurism Needle.....	1.50
3148	423	Hæmostat, Forcippresure Forceps.....	2.50	1262	50	Aseptic Spray.....	5.00
3166	428	Hæmostat, Gouley's Hydro.....	2.50	1484	94	Artery Clamp Forceps.....	2.25
3169	428	Hæmostat, Gross' Artery Compressor, ..	5.00	1383	84	Bistoury, Probe Pointed.....	1.50
3121	417	Knife, Blizard's American.....	1.75	1385	84	Bistoury, Sharp Pointed.....	1.50
3120	417	Knife, Blizard's English.....	2.00	1382	84	Bistoury, Straight.....	1.50
	417	Knife, Gross'.....	1.75	3113	417	Director.....	1.50
		Lithoclast, see Lithoclast.		58	General Operating Set.....	100.00	
3130	419	Lithotome, Brigg's.....	7.00	1384	84	Hernia Knife.....	1.50
3129	419	Lithotome, Hutchison's.....	7.00	3114	417	Lithotomy Bistoury.....	1.75
3128	419	Lithotome, Smith's.....	12.00	3140	421	Lithotomy Forceps.....	3.00
3123	417	Scalpel, Depuytren's.....	1.75	3115	417	Lithotomy Staff.....	2.00
3118	417	Scalpel, Probe Pointed.....	1.75	397	Median Lithotomy Set.....	54.00	
3116	417	Scalpel, Sharp Pointed.....	1.75	64	Minor Operating Set.....	40.00	
3157	426	Scoop, Luer's.....	2.50	64	Minor Operating Set, Ivory.....	45.00	
3136	421	Scoop and Conductor.....	2.50	1270	54	Operating Lounge.....	50.00
	397	Set in Case.....	47.00	67	Pocket Set.....	25.00	
	397	Set in Case, Little's.....	54.00	1376	84	Retractor.....	1.50
	397	Set in Case, May's.....	39.00	1379	84	Scalpel.....	1.50
	397	Set in Case, Van Buren and Keyes' ..	134.75	1380	84	Scalpel.....	1.50
3143	423	Sonde à Dard.....	3.50	1381	84	Scalpel.....	1.50
3144	423	Sonde à Dard, Helmuth's.....	6.00	3067	400	Searcher for Stone.....	3.50
3122	417	Staff, Buchanan's.....	2.50	2552	278	Trachea Tube, Aluminium.....	6.00
3131	421	Staff, Dowell's, and Gorget.....	5.50	1387	84	Tenaculum.....	1.50
3159	427	Staff, Hewitt's, and Knife.....	4.00	1716	126	Trocac.....	2.50
3125	419	Staff, Lateral.....	2.00	48	Local Anæsthesia.		
3115	417	Staff, Little's.....	2.00	1259	48	Richardson's Spray Apparatus.....	5.50
3113	417	Staff, Little's (Director).....	1.50	237	Lock-Jaw Instruments:		
3117	417	Staff, Markoe's.....	2.00	2368	237	Goodwillie's Speculum Oris.....	8.00
3126	419	Staff, Mason's.....	5.00	2376	237	Gross' Speculum Oris.....	5.00
3119	417	Staff, Steel.....	2.00	2373	237	Mott's-Heister's Speculum Oris.....	6.00
3138	421	Staff, Wood's.....	2.00	2375	237	Westmoreland's Speculum Oris.....	6.00
3142	423	Tenaculum, Keith's.....	1.25	2232	220	Loewenberg's Pharyngotome.....	5.00
	401	Lithotrites:		3768	540	Loewenthal's Obstetrical Forceps	20.00
3094	406	Bigelow's.....	40.00	2804	328	London Abdominal Supporter.....	5.00
3095	406			2032	188	Hearing Horn.....	4.00 to 5.50
TO		Bigelow's Improved.....	40.00	4128	674	Long Anchylosis Splint.....	35.00 to 40.00
3098	407			1354	82	Bullet Probe, Silver.....	.75
3110	412	Chismore's Evacuating.....	24.00	3674	515	Chain Ecraseur, Tiemann's.....	20.00
3083	403	Civiale's.....	25.00	1182	33	Handle Electrode.....	1.50
3078	402	Ferguson's.....	25.00	2907	350	Pipe Urethral Syringe.....	1.25
3088	404	Gouley's.....	35.00	1354	82	Silver Bullet Probe.....	.75
3079	402	Heurteloup's, and Mallet.....	25.00	3588	502	Long's Uterine Dilator and Injector.....	10.00
3076	402	Hunter's Trilabe.....	20.00	1026	5	Loomis' Stethoscope.....	1.75
3074	401	Jacobson's.....	30.00			Urinary Examination Set.....	32.00
3109	412	Keyes', Large.....	35.00	4164	692	Lordosis.	
3108	412	Keyes', Small.....	35.00			Lordosis Braces:	
3077	402	Lever.....	25.00	4167	692	Delicate Brace.....	40.00
3082	403	Teevan's.....	35.00	4165	692	Porous Felt Jacket.....	25.00
3081	403	Thompson's.....	35.00	4165	692	Russian Felt Jacket.....	25.00
	401	Lithotriety.		4166	692	Smith's Corset, Serpentine Springs.....	20.00

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
		\$35.00			\$2.50
1747	137	Lordosis Brace, Tiemann's.....	3044	389	Marey's Double Current Catheter.....
1745	134	Loring's Ophthalmoscope, Seven Lenses.....			Perineal Safety Pin.....
1748	138	Students'.....	1072	11	Marey's Sphygmograph.....
1751	141	Twelve Lenses.....			Marine Lint, per pound, in Box.....
1750	141	Upright Image, Double Disk.....	58		Markoe's General Operating Set.....
2074	194	Upright Image, Single Disk.....	1571	101	Sequestrum Forceps.....
2364	236	Lucæ's Reflux Ear Douche.....	3117	417	Staff, Lithotomy.....
3157	426	Luer's Cheek Retractor.....	4192	702	Torticollis Brace.....
3990	614	Lithotomy Scoop.....	1631	109	Marshall's Osteotrite.....
2736	311	Luxation Forceps.....	1023	5	Martin's Combination Stethoscope.....
3657	513	Polypus Forceps.....			Forceps.....
3822	552	Polypus Forceps.....			Needles, each.....
3792	548	Lusk's Cephalotribe.....	1278	74	Rubber Bandages, Prices on page 74.....
3779	543	Insufflator.....			Vaccine Virus, 10 Points.....
1911	163	Tarnier's Obstetrical Forceps.....	2030	188	Martineau Hearing Horn.....
3991	614	Luzardi's Hooked Needle.....	3126	419	Mason's Catheter Staff.....
3990	614	Luxation Forceps, Charriere's.....	64		Minor Operating Set.....
3989	614	Forceps, Luer's.....			Pocket Set.....
3987	614	Forceps, Plain.....	2631	297	Masticator.....
		Splint, Levis'.....	2959	362	Mastin's Stricture Cutter.....
		Lyman's Tube.....	2963	362	Maisonneuve's Urethrotome.....
			197		Mastoid Process:
			198		Abscess, Peroxide of Hydrogen in.
1639	112	Macewen's Chisel, 3 Sizes, each.....	2112	197	Chisel, Buck's.....
1641	113	Mallet.....	2113	197	Chisel, Buck's.....
1640	112	Osteotome, 3 Sizes, each.....	2118		
		Set of Chisels and Osteotomes, in Case.....	197		Chisels, Schwartz's, each.....
2511	270	Mackenzie's Antero-Posterior Throat For-	2122		
		ceps.....	2126	197	Drainage Tube, Gruening's.....
2576	283	Eclectic Inhaler.....	2124	197	Drainage Tube, Knapp's.....
2458	264	Laryngeal Brushes, each.....	2125	197	Drainage Tube, Knapp's.....
2512	271	Laryngeal Dilator.....	1619	108	Drill, Buck's.....
2498	269	Laryngeal Electrode.....	2127	197	Drill, Buck's.....
2486	267	Laryngeal Forceps, Scissors and Ecras-	1624	108	Drill, Plain.....
		seur.....	1622	108	Drill, with Guard.....
2485	267	Laryngeal Lancet, 2 Blades.....	1621	108	Gouge, Hand.....
2483	267	Laryngeal Lancet, 3 Blades.....	2111	197	Gouge, Hand.....
2456	264	Laryngeal Probes, each.....	2129	197	Gouge, Politzer's.....
2509	270	Lateral Throat Forceps.....	1620	108	Gouge, Post's Rongeur.....
2440	259	Light Concentrator.....	2114		
2610	291	Oesophagotome, Internal.....	197		Gouges, Schwartz's, each.....
2468	265	Sponge Holder, with Safety Wedge.....	2117		
2406	245	Tonsilotome.....	2108	197	Knife, Buck's.....
2413	246	Uvulotome.....	1623	108	Knife, Burnett's.....
		MacIntosh's Battery, see Battery.	2109	197	Knife, Burnett's.....
3450			2128	197	Knife, Politzer's.....
	487	Uterine Supporter, each.....	108		Perforating the.
3453			197		Perforation of the.
1177	32	Magnet, Electro.....	2110	197	Periosteotome, Buck's.....
1177	32	Electro, with Cells.....	1620	108	Rongeur, Post's.....
1989	176	Electro, Bradford's.....	2129	197	Scoop, Politzer's.....
1840	150	Electro, Gruening's.....	3771	541	Mathew's Obstetrical Forceps.....
1165	29	Magneto-Electric Machine.....			Obstetrical Forceps, with Screw.....
3155	426	Maisonneuve's Stone Crusher.....	2750	312	Mathieu's Prolapsus Ani Supporter.....
2952	360	Urethrotome.....	2507	270	Throat Forceps.....
	63	Major Surgery:	2402	244	Tonsilotome.....
	63	Amputating Set, Tiemann's Compact.....	3058	398	Urethral Lithotrite.....
	63	Amputating Set, Tiemann's No. 1.....	4212	712	Writers' Cramp Apparatus.....
	63	Amputating Set, Tiemann's No. 2.....	4215	713	Writers' Cramp Apparatus, for 3 Fin-
	63	Amputating Set, Tiemann's No. 3.....			gers.....
	63	Amputating and Trepanning Set.....	1328	80	Mathis' Needle Holder.....
	63	Capital Operating Set.....	1471	98	Mattock's Key Ring Artery Clamp.....
	64	Conant's Capital and Minor Operat-	1924	164	Maunoir's Scissors.....
		ing Set.....	1696	122	Maury's Fumigation Apparatus.....
		Malgaigne's Hooks.....	2667	305	Maw's Enema Pump.....
4401	769	Hooks, Modified by Otis.....	586		Maxilla, Fracture of.
4384	766	Mallet, Gerster's.....	1603	104	Saw, Left.....
1576	102	Leadens.....	1601	104	Saw, Right.....
1641	113	Rawhide.....	397		May's Lithotomy Set.....
1116	16	Steel, Post Mortem.....	2603	238	Steam Jacket.....
2870	345	Mallez's Bougie à Boule.....	1425	88	Tourniquet.....
2919	351	Powder Insufflator.....	3985	612	Mayor's Apparatus for Dislocated Clavicle.....
1816	149	Manfredi's Speculum, Ophthalmic.....	3660	513	McClintock's Polypus Forceps.....
2016	185	Manometer, Politzer's.....	1821	149	McFarlan's Lachrymal Syringe.....

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
3745	537	McFerran's Obstetrical Forceps.....	\$12.00			Mercurial Fumigation Apparatus:	
		McIntosh's Battery, see Battery.		1696	122	Maury's Apparatus	\$12.00
3450	487	Uterine Supporter, each	5.00	1694	122	Van Buren's Apparatus, complete ..	2.50
TO				1694	122	Van Buren's Lamp only	1.50
3453				1621	97	Metacarpal Saw	1.50
		Waterproof Cloth, per yard		1524	97	Detmold's	1.50
3947	597	McIntyre's Splint.....	16.00	1523	97	Lente's Interosseous.....	1.50
2043	191	McKay's Ear Forceps	2.50	1525	97	Lifting Back, Large	4.00
3606	504	McLean's-Barnes' Dilator	2.50	1525	97	Lifting Back, Medium	3.00
3597	503	Dilator Introducer	4.50	1522	97	Lifting Back, Small	2.50
3749	538	Obstetrical Forceps	8.00	1231	36	Metallic Foot Plate Electrode	.50
2517	273	McSherry's Laryngeal Dilator	11.00	1218	35	Handle Electrode, per pair.....	1.50
2516	273	Tracheotomy Tube	5.00	1215	35	Points for Faradization	1.00
3194	437	Meadow's Quatrivalve Speculum	15.00	1211	35	Scourge, Electrode	.75
3186	435	Trivalve Speculum	10.00	1226	36	Sound, Electrode	.75
2894	347	Meatome, Piffard's	1.50	3435	484	Metratrep, White's.....	14.00
2852	343	Meatoscope, Glass, each	.50	2841	399	Metric Scale for Urethral Instruments ..	3.50
2853	348	Weir's	1.25	2848	341	Scale, Otis'	3.50
2887	347	Meatome, Civiale's (Bistoury Caché).....	5.00		771	System.	
2888	347	Gouley's	3.00	3380	475	Metrorganon, Newman's	3.00
2889	347	Mitchell's	22.00			Metrotome, see Hysterotome.	
2891	347	Otis'	1.75	187		Microcoustic, see also Ear Trumpets.	
2892	347	Piffard's	2.00	1074	12	Microscope	45.00 to 100.00
2890	347	Piffard's Fossal Stricture Knife.....	10.00		12	Microscopical.	
		Meatus, Auditorius Externus, see Aural:		1086	13	Microscopic Bistoury, Probe Pointed	1.25
		Diagnostic.		1087	13	Bistoury, Sharp Pointed.....	1.25
	343	Urinarius.			17	Dissecting Set	15.00
	5	Mediate Auscultation.		1079	12	Exploring Trocar	1.50
		See also Stethoscope.		1075	12	Exploring Trocar, Duchenne's	2.50
	7	Mediate Percussion.		1076	12	Exploring Trocar, Duchenne's	3.50
		See also Percussion.		1077	12	Exploring Trocar, Noeggerath's	3.50
		Medical Saddle Bags:		1078	12	Exploring Trocar, Tiemann's.....	2.50
1149	22	With 16 Vials	6.00	1096	13	Forceps, Curved	.75
1150	22	With 16 Vials	10.00	1095	13	Forceps, Straight	.75
1151	22	With 16 Vials	10.00	1092	13	Needle, Curved or Straight	.50
1149	22	With 20 Vials	7.00	1091	13	Needle Holder	1.25
1150	22	With 20 Vials	11.00	1085	13	Scalpel, Fixed Handle	.75
1151	22	With 20 Vials	11.00	1088	13	Scalpel, Folding Handle	1.00
1149	22	With 24 Vials	8.00	1073	12	Scissors, Transplantation	10.00
1150	22	With 24 Vials	12.00	1080	12	Section Cutter, Jewett's	9.00
1151	22	With 24 Vials	12.00	1084	13	Section Knife	1.50
		Send for complete Price List.		1090	13	Section Knife, Charrière's.....	8.00
1148	22	Medicine Chest	20.00 to 35.00	1081	12	Section Knife, Curtis'	3.50
1147	22	Chest No. 1	12.00	1083	13	Section Knife, Piffard's	5.00
1147	22	Chest No. 2	15.00	1093	13	Section Knife, Small	.50
1147	22	Chest No. 3	18.00	1094	13	Section Knife, Spear Pointed.....	.75
1147	22	Chest No. 4	6.00	1082	12	Section Knife, Valentine's.....	8.00
		Send for complete Price List.		1081	12	Section Knife and Frame	15.50
	19	Medicine Pocket Cases:		1089	13	Section Razor	2.00
1146	21	Fuller's, Style 1.....	2.75	1097	13	Syringe, Brass	6.50
1146	21	Fuller's, Style 2.....	3.00	1098	13	Syringe, Brass, No. 1	10.50
1146	21	Fuller's, Style 3.....	3.50	1097	13	Syringe, Hard Rubber	5.50
1146	21	Fuller's, Style 4.....	5.00			Midwifery, see Obstetrical.	
		Send for complete Price List.		2811	331	Milano's Compressor.....	2.00
1129	18	Medulla Oblongata Drill.....	1.75		61	Military Surgery:	
3816	551	Meigs' Craniotomy Forceps, Angular	3.50	1273	61	Otis' U. S. A. Field Set	160.00
3817	551	Craniotomy Forceps, Curved	3.50		62	U. S. A. Capital Operating Set	102.50
3815	551	Craniotomy Forceps, Straight	3.50		62	U. S. A. Staff Surgeons' Capital Oper-	
	196	Membrana Tympani.				ating Set.....	137.10
		See also Aural: Membrana Tympani.			62	U. S. A. Staff Surgeons' Minor Oper-	
3025	385	Mercier's Double-Elbowed Catheter (Bicou-				rating Set.....	136.00
		dée)	1.00	1680	130	Milium Needle, Piffard's.....	1.25
3063	399	Duplicator	25.00	1740	133	Miller's Aspirator.....	7.00
3024	385	Elbowed Catheter (Coudée)	1.00			Obstetrical Forceps	8.00
3092	405	Evacuating Apparatus, or Washing		3763	540	Obstetrical Forceps, Jointed	15.00
		Bottle		3590	502	Uterine Dilator	10.00
3004	379	Excisor, First	40.00	2001	183	Millikin's Ear Speculum	1.50
3006	379	Excisor, Last	50.00	1478	93	Milne's Artery Compression Forceps ..	1.50
3005	379	Incisor and Ecraseur, Combined.....	60.00	2982	370	Dilating Urethrotome	17.00
3042	388	Invaginated Catheter	3.50	2631	297	Mincer (Masticator)	8.00 and 12.00
3008	390	Prostatic Gland Dilator	10.00	1146	21	Minim Measure, No. 2	.75
3002	378	Rectangular Sound.....	1.50	1146	21	Pipette, No. 1	.50
	122	Mercurial Fumigation Apparatus:				Minor Operating, see Minor Surgery.	
1695	122	Bumstead's-Lee's Lamp	3.00				

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.		
64		Minor Surgery Cases or Sets:		1010a	3	Mohr's Burette	\$2.50		
65		Enos'	\$33.00	1010b	3	Stand	1.50		
65		Eves'	33.50			Molar Forceps, see Dental Forceps.			
65		Hospital	74.80			Moleskin Adhesive Plaster, per yard	1.50		
64		Little's	40.00	2526	276	Mop for Cleansing Trachea Canulas	.15		
64		Little's, Ivory Handles	45.00	637		Morbus Coxarius.			
64		Mason's	44.00			See also Orthopædic: Diseases of the			
65		Plain	18.00			Joints.			
64		Powell's	85.00			Morgan's Needle	.30		
65		Tiemann's	25.00			Suspensory	1.50		
		Minor Surgery Instruments:		1257	48	Morton's Ether Inhaler	5.00		
1404	85	Scissors, Angular	1.50	1364	83	Mose's Bullet Extractor	3.50		
1403	85	Scissors, Artery	1.75	3536	494	Mossman's Stem Pessary	5.00		
1405	85	Scissors, Curved on the Flat	1.50	1460	92	Mott's Aneurism Needles, per set	2.75		
1406	85	Scissors, Straight	1.00		60	General Operating Set	72.85		
		Minor Surgery Instruments, Ebony Han-		1554	100	Retractor, per pair	1.50		
		dles, Feruled:		2373	237	Speculum Oris	6.00		
1378	84	Aneurism Needle	1.25	1436	89	Tourniquet	2.00		
1386	84	Aneurism Needle, Little's	1.50	221		Mouth and Throat.			
1383	84	Bistoury, Little's, Probe Pointed	1.50			Mouth Gag, see Gag.			
1385	84	Bistoury, Little's, Sharp Pointed	1.50			Mouth Specula (Specula Oris), see Lock-Jaw			
1382	84	Bistoury, Little's, Straight	1.50			Instruments.			
1370	84	Bistoury, Probe Pointed	1.25	2496	268	Movable Point Scissors, Haywood Smith's	12.00		
1369	84	Bistoury, Sharp Pointed	1.25	2488	267	Tiemann & Co.'s	8.50		
1368	84	Bistoury, Straight, Blunt Pointed	1.25		68	Multum in Parvo Pocket Set	19.00		
1388	84	Dry Dissector, Hamilton's	1.50			Munde's Applicator, Hard Rubber	.50		
1389	84	Dry Dissector, Hamilton's	1.50			Aspirator and Hypodermic Syringe	12.00		
1393	84	Dry Dissector, Hamilton's	1.50			Counter-pressure Hook	1.50		
1394	84	Dry Dissector, Hamilton's	1.50			Curette, Placenta	3.00		
1367	84	Finger Knife	1.25			Curette, Uterine, Blunt	1.50		
1391	84	Graduated Knife	3.00			Curette, Uterine, Sharp	1.50		
1371	84	Hernia Knife, Cooper's	1.25	472		Gynæcological Pocket Case	16.00		
1384	84	Hernia Knife, Little's	1.50			Ointment Tube	2.00		
1376	84	Retractor, Little's	1.50			Pessary, Anteversion	1.25		
1366	84	Scalpel, 4 Sizes, each	1.25			Placenta Forceps	3.00		
1379	84	Scalpel, Little's	1.50	2672	305	Rectal Irrigator	1.50		
1380	84	Scalpel, Little's	1.50	3246	447	Speculum Vaginae	3.50		
1381	84	Scalpel, Little's	1.50	3950	598	Munger's Splint, Complete	6.00		
1377	84	Tenaculum	1.25	3486	562	Munson's Quill Suture Stay, per pair	.75		
1387	84	Tenaculum, Little's	1.50	1169	32	Murray's Electrolysis Needle	1.25		
1374	84	Tenotome, Blunt Pointed	1.25	2394	243	Musseux's Forceps, Vulsellum	2.50		
1372	84	Tenotome, Concave Edged	1.25	3163	428	Mussey's Bladder Curette	4.50		
1373	84	Tenotome, Convex Edged	1.25	2369	237	Mouth Gag	7.00		
1375	84	Tenotome, Sharp Pointed	1.25	2103	196	Myringotome, Buck's	1.00		
1392	84	Tissue Separator, Post's	1.50	2099	196	Politzer's, Angular	1.00		
		Ivory Handles, 25 cents extra.		2105	196	Politzer's, Straight	1.00		
		Minor Surgery Instruments, Ebony Handles,		2104	196	Prout's	1.00		
		Riveted:				1753	143	Nachet's Trial Set	
1398	85	Bistoury, Probe Pointed	1.00	3772	541	Nægeli's Obstetrical Forceps	8.00		
1399	85	Bistoury, Sharp Pointed	1.00	3797	549	Perforator	4.00		
1397	85	Cooper's Hernia Knife	1.00	1690	121	Nævus Needle	.50		
1396	85	Finger Knife, Straight	1.00		745	Nail:			
1400	85	Scalpel	.75		747	Chiropodists' Pocket Set, Goldberg's	37.00		
1401	85	Scalpel	.75	4287	746	Cleaner and File	.50		
1402	85	Scalpel	.75	4293	746	Extracting Forceps	2.50		
1395	85	Tenaculum	.75	4294	747	Extracting Forceps, Van Buren's	2.50		
		See also Pocket Instruments.		4289	746	Nippers	3.00		
71		Minor's Pocket Set	22.50	4295	747	Spring for Inverted Nails	.25		
2936	355	Stricture Dilator, per set	3.50	2986	370	Nall's Dilating Urethrotome	40.00		
2555	279	Trachea Retractors	4.50	203		Nasal:			
84		Miotomy.		2189	211	Applicator, Bosworth's	1.50		
		See also Minor Surgery Instruments.		2193	211	Applicator, Bridge's Insufflator	.75		
1997	183	Mirror, Ear, Troeltsch's	3.00	2432	254	Applicator, Lefferts' Insufflator	4.00		
2018	185	Inner Ear, Blake's	8.00			Applicator, Sajou's Acetic Acid	10.00		
		Laryngoscopic, see Laryngoscopic				Applicator, Sajou's Chromic Acid	10.00		
		Mirror.				Applicator, Smith's	2.50		
		Speculum, see Specula.		2218	217	Clamp, Bosworth's	2.50		
1255	46	Mitchell's Ether Inhaler	2.00	2194	212	Clamp, Caro's	.75		
2889	347	Meatotomy	22.00	2219	217	Clamp, Gouley's	5.00		
2923	352	Reflux Catheter, with Tiemann's Pa-		2201	218	Curette, Buck's	1.00		
		tent Velvet Eye	.75	2051	191	Curette, Quire's	2.25		
	181	Mittendorf's Set of Eye Instruments	50.00	4409	770	Dilator, Goodwillie's	.75		
2781	323	Moc-Main Truss	8.00						
1010c	3	Mohr's Beaker	.10 to .30						

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
Nasal:				Nasal Speculums:			
2149	205	Dilator, Woakes'	\$18.00	2157	205	Colin's	\$3.50
2148	204	Dilator, Yearsley's	.50	2153	205	Elsberg's	5.00
2192	211	Douche, Bridge's	.75	2166	206	Folsom's	1.50
2181	210	Douche, Chapman's Spray	5.00	2155	205	Fränkel's	3.50
2176	209	Douche, Clark's	1.50	2158	205	Goodwillie's	1.00
2180	210	Douche, Fullgraff's	3.50	2162	206	Jarvis'	.75
2186	211	Douche, Fullgraff's Posterior	3.00	2161	206	Jarvis' Operating	3.00
2177	209	Douche, Thudichum's	1.50	2156	205	Robert and Colin's	3.50
2183	210	Douche, Warner's Catarrhal	1.00	2165	206	Sexton's	1.00
2178	209	Douche, Weir's Sniff Glass	.75	2154	205	Shurley's, Right and Left, each	3.50
2179	209	Douche, Woake's Irrigator	1.25	2152	205	Simrock's	1.50
		Duct, see Ophthalmic, Lachrymal.		2663	206	Smith's, Andrew H.	1.50
1192	34	Electrode	.75	2164	206	Thudichum's, Right and Left, each	.75
1191	34	Electrode	1.00	4322	755	Turnbull's	6.00
2196	212	Epistaxis Canula, Belocq's, Plated	2.00	2159	206	Zaufal's, 3 Sizes, each	1.50
2196	212	Epistaxis Canula, Belocq's, Silver	3.00	2417	249	Nasal Spray, Lefferts'	4.00
2194	213	Epistaxis Clamp, Caro's	.75	2418	249	Syringe, Lefferts'	3.00
2195	212	Epistaxis Tampon, Rubber	.75	215		Tissue, Hypertrophied.	
2620	204	Feeding Tube, Paine's	1.00	2210	216	Tissue, Robinson's Evulsion Forceps,	4.50
2200	213	Foreign Body Hook	1.00	216		Nasal Turbinate Bones:	
2226	219	Plug, Hard Rubber	.75	2213	216	Woakes' Plough, R. and L., each	2.50
2203	213	Polypus Canula	1.50	2212	216	Woakes' Plough Guide, R. and L., ca.,	3.75
2209	215	Polypus Canula Scissors, Smith's	5.00	2211	216	Woakes' Scissors, R. and L., each	6.00
Nasal Polypus Ecraseurs:				220		Naso-Pharyngeal, see also Pharyngeal.	
2208	215	Bettman's-Jarvis' Snare	8.50	220		Evulsion of the Pharyngeal or Lusch-	
2207	215	Bosworth's-Jarvis' Snare	5.00			ka's Tonsil:	
2205	214	Jarvis' Snare	3.00 and 4.00	2232	220	Loewenberg's Pharyngotome	5.00
		Jarvis' Snare, with Curved and Straight		2233	220	Wagner's Post Nasal Forceps	3.50
		Ends	5.00	2514	272	Navratil's Laryngeal Dilator	
3675	516	Sajou's Snare	4.00	2582	284	Nebulizer, Seeger's, Steam	12.00
		Sajou's Snare, with Curved and				See also Inhaler and Spray.	
		Straight Ends	5.00	1208	35	Neck Electrode	2.00
2210	216	Nasal Polypus Evulsion Forceps, Robinson's	4.50			Necrosis Forceps, see Rongeurs and Sequ-	
2199	213	Nasal Polypus Forceps	1.50			trum Forceps.	
2198	213	Crossing Blades	1.50	3731	533	Needle, Abdominal, Fixed Handle	.75
2197	213	Gross'	2.25	3835	561	Agnew's, and Holder, per set	4.50
2202	213	Simrock's	2.50	1983	175	Agnew's Tattooing	2.00
2204	213	Nasal Polypus Syringe, Upson's	14.00	1463	92	Aneurism, Plain	.75
2206	214	Polypus Transfixion Needle	.75			See also Artery Needle.	
		Nasal Rhinoscope, see Rhinoscope and Rhi-		3840	561	Ashton's Perineum	1.00
		noscopic.		1982	175	Baader's Tattooing	2.00
4320	755	Nasal Saws, Bosworth's, each	2.00	1978	174	Bowman's Stop	1.75
4321	755	Bucklin's	4.00	3322	457	Bozeman's, per dozen	1.50
2231	220	Woake's	2.00	1318	70	Buck's Pin Conductor	1.75
		Nasal Scissors, Potter's	4.50	1883	157	Canthoplasty, Prince's	2.50
		Roe's	4.50	1319	79	Canulated	4.00
4315	755	Sherwell's	5.00	1835	150	Carron de Villard's, Eye	1.25
4316	755	Sherwell's	7.00			Cataract, see Ophthalmic: Iris Needle.	
2209	215	Smith's	5.00	1325	80	Cleborne's (Tenaculum Needle and	
		Nasal Septum:				Wire Twister)	7.00
2220	218	Cartilage Forceps, Jarvis'	4.50	1461	92	Crampton's Artery, per pair	5.00
2218	217	Clamp, Bosworth's	2.50	2764	317	Dowell's, Hernia, each	1.00
2219	217	Clamp, Gouley's	5.00			Electrolysis, see Electrolysis Needle.	
2224	219	Double Gouge Forceps, Weir's	3.50	1320	79	Emmet's, Suture, per dozen	1.50
2228	219	Excisor, Jarvis'	5.00	1784	146	Eye, Suture, per dozen	1.50
2230	220	Exostosis Trocar, Wilkerson's	3.50	1317	79	Finnell's, Post Mortem, each	.20
2227	219	Punching Forceps, Jarvis'	8.50	1462	92	Fletcher's, Aneurism	3.00
2223	219	Punching Forceps, Roberts'	6.00	2346	235	Goodwillie's, Staphylorrhaphy, per set,	12.00
		Punching Forceps, Sajou's	20.00			Hæmorrhoidal, see Hæmorrhoidal	
2225	219	Punching Forceps, Steel's	10.00			Needle.	
2229	220	Rhinometer, Jarvis'	9.00	4377	765	Hæmostatic, each	.15
2215	217	Rhinoplastos, Adams'	3.00	3310	455	Hagedorn's, Suture, per card	3.00
2217	217	Rhinoplastos, Bosworth's	3.50	3310	455	Hagedorn's, Suture, per dozen	1.50
2216	217	Rhinoplastos, Weir's	3.00	1905	163	Hayes' Knife Needle	1.50
2222	218	Rongeur, Jarvis'	4.50	1464	92	Helical	1.75
		Saw see Nasal Saw.		1467	92	Helmuth's (Ligature Carrier)	3.50
2214	217	Septometer, Seiler's	4.50			Hernial, see Hernia: Radical Cure of.	
2221	218	Trimming Scissors, Jarvis'	9.00	2719	309	Hutchison's	2.50
2230	220	Trocar, Wilkerson's	3.50	125		Hypodermic, Prices on page 125.	
Nasal Speculums:						Iris, see Ophthalmic, Cataract: Iris	
2151	205	Bivalve	1.50			Needle.	
2150	205	Bonafont's	2.50	3730	533	Keith's Abdominal, each	.10
2160	206	Bosworth's	1.50	2824	334	Keyes' Varicocele, each	1.75

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Needle, Keyes' Varicocele, Improved.....	\$6.00	3827	556	Needle Forceps, Skene's	\$5.50
1314	79	Ligature and Perineum	1.00	1338	81	Stimson's	3.50
		Martin's	.25	3304	454	Tiemann's Combination	6.00
1092	13	Microscopic, Straight or Curved	.50	3831	558	Van de Warker's	7.00
1680	120	Milium, Pillard's	1.25	3833	559	Von Ramdohr's	10.00
		Morgan's	.80			Wight's	2.50
1460	92	Mott's, Aneurism, per set	2.75	1330	80	Wyeth's	4.50
1690	121	Nævus	.50			Wyeth's Combination	6.00
1321	79	Open Eyed	.25	1350	82	Nelaton's Bullet Probe	.60
1466	92	Ostrom's (Ligature Carrier)	3.00			Catheter	.50
		Paracentesis Corneæ, see Ophthalmic : Paracentesis Corneæ.		3090	405	Evacuating Apparatus	30.00
3842	561	Parker's Perineum, per set	5.00	3647	512	Pedicle Forceps	3.50
3732	533	Peaslee's Perineum	3.00	2829	336	Phimosis Forceps	5.00
3839	561	Peaslee's Perineum, per set	3.00	3854	512	Tumor Forceps	3.50
3841	561	Peaslee's Perineum, R. and L., each	1.75	3057	398	Urethral Foreign Body Instrument	40.00
		Perineal, see Perineorrhaphy.		3191	435	Nelson's Speculum Vaginæ	4.50
		Pile, see Hemorrhoidal Needle.		3591	502	Uterine Dilator	5.50
1321	79	Platt's Open-Eyed	.25	1139	19	Nerve Knife	1.50
		Polk's, for Extirpation of Uterus	4.50		704	Nerves, Affections of.	
		Post's (Pin Conductor)	1.00		623	Wounds and Injuries of.	
1326	80	Post's and Buck's (Pin Conductors)	2.50	3218	442	Neugebauer's Speculum	2.50
2348	235	Prince's, Staphylorrhaphy	10.00	2592	286	Newman's Atomizer	6.00
2352	235	Prince's, Tenaculum Needle	10.00			Electrolysis Catheter	4.50
4413	770	Reverdin's, in Fixed Handle	6.00			Electrolysis Bougie à Boule	2.50
		Reverdin's, in Folding Handle	6.00			Electrolysis Sound	3.00
1320	79	Sims' Suture, per dozen	1.50			Electrolysis Sound, Tunnelled	4.00
3722	760	Skene's, Cervix, per dozen	1.50	3380	475	Metrorrhagon	3.00
3843	561	Skene's, Perineum	1.75	3766	540	Obstetrical Forceps	7.00
		Staphylorrhaphy, see Staphylorrhaphy Needle.				Ointment Tube, Hard Rubber	1.50
		Suture, see Suture Needle.		2575	283	Nichols' Inhaler	5.00
		Tattooing, see Ophthalmic : Tattooing Needle.		3319	456	Nilsen's Counter-pressure Fork and Tier	1.75
		Thomas', for Extirpation of Uterus	4.50	2572	282	Nitz's Respirator	1.50
		Uterine, see Uterine Needles.		4406	770	Noeggerath's Clamp	7.00
		Wackerhagen's	1.00	1077	12	Exploring Trocar	3.50
1975	174	Walton's Reclination	1.25	3468	489	Pessary	2.00
2334	233	Whitehead's Spiral	1.75	2807	328	Supporter	6.00
1918	163	Wilde's Canulated Forceps, Forceps-Needle and Scissors	15.00	3433	483	Uterine Elevator	9.00
1316	79	Wire Suture, per dozen	.50	2147	203	Nose, Artificial	50.00 to 125.00
		Needle Forceps (Holders or Carriers) :		3408	477	Nott's Applicator	4.50
2720	309	Artery and	2.50	1481	94	Artery Clamp Forceps	6.00
1449	91	Artery and, Old's	2.25	3234	445	Depressor	1.50
3322	457	Bozeman's	5.00	3249	448	Depressor	1.50
4390	767	Dawbarn's	7.00	3421	482	Double Current Catheter	3.00
3308	454	Dawson's	3.50	3422	482	Double Current Catheter	2.50
1336	80	De Gaine's "Russian"	4.00	3046	389	Double Current Catheter	3.00
4381	765	Diefenbach's	3.00	3409	477	Hard Rubber Uterine Syringe	2.50
1341	81	Dudley's-Sand's	4.50	3290	452	Knife, Vesico-Vaginal Fistula	1.50
3307	454	Emmet's	3.00	3291	452	Knife, Vesico-Vaginal Fistula, Angular	1.50
		Fowler's	6.00	3559	473	Needle Holder, No. 1	4.50
1688	121	Fox's	3.50	3708	529	Rectilinear Ecraseur	12.00
3312	455	Hagedorn's	8.00		472	Set of Uterine Instruments	111.46
1331	80	Heuel's	4.00	3211	441	Speculum Vaginæ	4.00
1781	146	Knapp's	3.50	3552	497	Tenaculum	.25
1339	81	Küster's	3.50	3314	456	Twisting and Needle Forceps	3.00
1328	80	Mathis'	5.00	3581	501	Uterine Dilator	3.50
1091	13	Microscopic	1.25	3359	473	Uterine Instruments, per set	10.00
1329	80	Needle Forceps	3.50	3409	477	Uterine Syringe	2.50
3359	473	Nott's-Roux's	4.50	2463	264	Noyes' Brush Holder	2.25
1449	91	Old's Artery and	2.25	1806	148	Canalicula Knife, Movable	4.00
		Otis' Combination	11.00	1805	148	Canalicula Knife, Plain	1.75
1335	80	Parker's	4.00	1804	148	Canalicula Knife, Stilling's	1.75
3313	456	Parrott's	5.00	2072	193	Ear Forceps	4.50
1340	81	Prout's	3.50	2135	199	Eustachian Catheter, R. and L., ea.,	2.50
1332	80	Reiner's	4.00	1849	151	Eyelid Retractor	1.75
1334	80	Roux's	4.50	1861	152	Fixation Forceps	3.00
1336	80	Russian	4.00	1844	151	Improved Eye Speculum	4.50
1341	81	Sand's	4.50	1844	151	Improved Eye Speculum, Gilt	5.00
1337	81	Sims'	2.50	1927	164	Iris Scissors	4.50
2712	309	Sims'	2.50	1814	149	Lachrymal Gouge	2.50
3303	454	Sims'	2.50	1746	135	Lens Holder	6.00
				1954	168	Lens Spoon	1.75
				1900	162	Linear Knife	1.50
				1865	152	Ophthalmostate	2.00

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
1843	151	Noyes' Plain Eye Speculum	3758	539	Obstetrical Forceps:
	181	Set of Eye Instruments			Ives'
1804	148	Stilling's Knife	3757	539	Jenks', Long
2500	269	Throat Forceps	3756	539	Jenks', Short
3391	476	Numm's Applicator	3775	541	Jewett's
1176	32	Catheter Electrode	3768	540	Loewenthal's
1705	124	Hypodermic Syringe and Pellet Holder,			Lusk's-Simpson's
4347	759	Pad for Emmet's Speculum	3779	543	Lusk's-Tarnier's
3243	447	Speculum Vaginæ	3771	541	Mathew's
3377	475	Uterine Dressing Forceps			Mathew's, with Screw
3382	475	Uterine Dressing Forceps and Scis- sors	3745	537	McFerran's
4210	712	Nussbaum's Bracelet for Writer's Cramp ..	3749	538	McLean's
4156	689	Nyrop's Spring Shoulder Brace			Miller's
4259	736	Talipes Valgus Shoe	3763	540	Miller's, Jointed
			3772	541	Nægeli's
					Neal's-Tarnier's
			3766	540	Newman's
			3750	538	Osborn's
		O'Bierne's Tube, 12 inch			Pierce's
		Tube, 18 inch	3774	541	Robertson's
3785	548	Obstetrical, Amniontome, Wenck's	3737	536	Robinson's
3823	552	Bag	3770	541	Rockwell's
3813	551	Basiotribe, Tarnier's	3765	540	Roller's
3806	550	Blunt Hook, Taylor's	3760	539	Sawyer's
3805	550	Blunt Hook and Crotchet	3744	537	Sawyer's, Long
3808	550	Blunt Hook and Crotchet, Bedford's ..	3741	537	Sawyer's, Short
3807	550	Blunt Hook and Crotchet, Guarded ..	3773	541	Schuyler's
		Obstetrical, Cephalotribes:	3782	546	Simpson's, Long
3820	552	Braun's			Simpson's, Short
		Hicks'			Simpson's-Tarnier's
3822	552	Lusk's	3776	542	Tarnier's (Original)
3821	552	Simpson's			Tarnier's (1887)
3818	551	Van Huvel's	3735	536	Tarsitani's
		Obstetrical, Cord Carriers:	3746	538	Taylor's
3780	544	Filet	3752	538	Thomas'
		Plain	3755	539	Trueheart's
3789	548	Scholler's	3767	540	Vedder's
3819	552	Obstetrical, Cranioclast, Simpson's ..			Wallace's-Hodge's
		Obstetrical, Craniotomy Forceps:	3738	536	White's
3816	551	Meigs', Angular	3786	548	Obstetrical: Funis Clamp, Pulling's ..
3817	551	Meigs', Curved			Obstetrical, Insufflators:
3815	551	Meigs', Straight	3792	548	Lusk's
3809	550	Obstetrical, Decapitating Hook	3794	548	Robinson's
3810	550	Decapitating Hook, Braun's			Obstetrical Lever, see Obstetrical Vectis.
		Obstetrical, Embryotomy Forceps:			Obstetrical Manikin, American
3793	548	Bachelder's			French, Imported to Order.
3791	548	Tiemann's			Obstetrical, Perforators:
		See also Obstetrical: Placenta Forceps.	3796	549	Bachelder's
		Obstetrical Forceps:	3802	549	Bedford's
		Barnes'	3804	550	Blot's
3762	540	Bedford's	3812	550	Braun's Trepine
3739	537	Bethel	3798	549	Holme's
3759	539	Blake's	3797	549	Nægeli's
		Braun's-Simpson's	3800	549	Simpson's
3781	545	Braun's Triform	3803	549	Smellie's
		Breus'-Tarnier's	3813	551	Tarnier's Basiotribe
3736	536	Brickel's	3801	549	Thomas'
3753	538	Budd's	3811	550	Trueheart's Trepine
		Burdick's	3799	549	White's
3778	542	Burge's			Obstetrical, Placenta Prævia:
3761	539	Buzzle's	3605	504	Barnes' Dilators, each
3743	537	Cole's	3605	504	Barnes' Dilators, Set of 3, with Stop- cock and Syringe
		Cole's-Tarnier's	3784	547	Braun's Colpeurynter
3742	537	Comstock's	3607	504	Cowan's Dilators, Set of 3
3777	542	Corning's-Tarnier's	3606	504	McLean's-Barnes' Dilator
3754	539	Davis'	3597	503	McLean's Forceps, for Introducing Dilator
3751	538	Denman's			See also Uterine Dilators.
3764	540	Draper's			Obstetrical, Placenta, Removal of:
3747	538	Elliott's	3790	548	Hook and Lever, Dewey's
3748	538	Gillette's	3795	548	Placenta Forceps
3769	541	Hale's			Placenta Forceps, Bozeman's
3734	536	Hodge's			Placenta Forceps, Loomis'
		Howard's-Tarnier's			
3740	537	Hunter's			

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Obstetrical Sets, in Cases:				Operating Cases:	
	553	Bedford's	\$28.00	61		Military Surgery.	
	553	Brickell's	48.00	64		Minor Surgery.	
	553	Budd's	40.00	66		Pocket Cases.	
	553	Elliott's	35.00	51		Operating Furniture:	
	553	Hodge's	16.00	1264	51	Bozeman's Operating Chair	\$35.00
	553	Taylor's	28.00	1271	55	Clark Office Chair	
	553	Thomas'	66.00	1267	53	Comstock's Gynæpod	20.00
	553	Tiemann's	72.00	1267	53	Comstock's Gynæpod, with Speculum	25.00
		Obstetrical Vectis	2.50	1272	55	Crosby Invalid Bedstead	
3787	548	Folding	3.50	4396	768	Daggett's Examining and Operating	
3788	548	Ryerson's	7.00			Table	25.00 to 45.00
3783	546	White's	2.50	1265	51	Foster's Combined Gynæcological	
	542	Obstetrics, Axis Traction.				Table and Instrument Case	100.00
	546	Delivery in Obstructed Labor.		1268	53	Foster's Speculum Holder, with 2	
	534	Labor or Parturition.				Blades	15.00
	274	O'Dwyer on Intubation of the Larynx.		3689	521	Harvard Physicians' and Surgeons'	
2519	274	O'Dwyer's Gag	6.00			Chair	
4407	770	Laryngeal Snare	3.50	1269	54	Knapp's Oculists' Operating Chair	70.00
2521	274	Scale of Lengths for Tubes	.50	1270	54	Little's Operating Lounge	50.00
	274	Set, Complete in Case	35.00	134		Ophthalmic:	
2520	274	Tube	2.00	158		Anatomy of the Globe.	
		Tube and Obdurator	3.00	153		Anatomy of the Muscles.	
2522	274	Tube Extractor	5.00			Artificial Eye, see Artificial Eye.	
2520	274	Tube Introducer	5.00	160		Artificial Pupil, see also Ophthalmic:	
2493	268	Cedema Glottis Instrument, Grant's	1.50			Cataract.	
		Esophageal Forceps:		1828	150	Bath Glass	.50
2617	292	Dawson's	8.00	1827	150	Drop Glass	.20
2616	292	Tiemann's	5.00	165		Ophthalmic, Cataract and Artificial Pupil:	
		See also Laryngeal Forceps and		166		Corneal or Flap Operation.	
		Throat Forceps.		166		Linear Extraction.	
		Esophageal, Foreign Body Instruments:		166		Modified Linear or Spoon Operation.	
2613	292	Probang, Bristle	1.50	174		Needle Operation.	
2612	292	Probang, Silver Bucket	3.50	174		Secondary and Capsular Cataracts.	
		Probang, Sponge	.25	173		Soft Cataract, Suction.	
2614	292	Probang, Stanford's	2.50	1965	172	Ophthalmic, Cataract: Capsulotome, Knapp's, 1.75	
2615	292	Scoop, Schaffer's	8.00			Ophthalmic, Cataract, Cystotomes:	
		Esophageal Stricture Dilators:		1947	168	Cystotome	1.50
2609	291	Crawcour's, each	2.50	1949	168	Cystotome and Spoon	2.50
2606	291	Hard Rubber	1.00	1948	168	Graefe's	1.50
2605	290	Hard Rubber and Whalebone, per set.	4.00	1946	168	Knapp's	1.75
2607	291	Roe's, each	1.00	1964	171	Knapp's Needle-Cystotome	1.75
2610	291	Esophagotome, Mackenzie's	15.00			Ophthalmic, Cataract, Fixators:	
2608	291	Roe's	15.00	1858	152	Carron de Villard's Fixation Forceps,	3.00
2611	291	Sands'	40.00	1863	152	Curved Fixation Forceps	2.00
3602	504	Ohr's Uterine Dilator and Corrector	7.50	1860	152	De la Roza's Fixation Forceps	2.00
		Oiled Silk, per yard	1.50	1868	152	Double Hook	1.50
2916	351	Ointment Bougie	2.00	1857	152	Dudley's Fixation Forceps	3.00
3401	477	Bougie, Barker's	1.25	1859	152	Fixation and Tumor Forceps	1.50
2918	351	Bougie, Caspar's	2.00	1862	152	Graefe's Fixation Forceps	2.00
2915	351	Bougie, Van Buren's	2.00	1864	152	Jaeger's Ophthalmostate	8.00
3402	477	Syringe, Hutchison's, with 1 Hard		1861	152	Noyes' Fixation Forceps	3.00
		Rubber Tube	3.00	1865	152	Noyes' Ophthalmostate	2.00
3402	477	Syringe, Hutchison's, with 3 Silver		1866	152	Pamard's Pique	1.50
		Tubes	10.00	1867	152	Three-pointed Ophthalmostate	1.50
3403	477	Syringe, Lente's	4.50			Ophthalmic, Cataract, Iris Forceps:	
3407	477	Syringe, Lente's	8.00	1940	165	Fischer's	1.25
1449	91	Old's Artery and Needle Forceps	2.25	1935	165	Graefe's, Angular	1.75
1295	76	Dressing Forceps and Scissors	3.50	1933	164	Lanne's Forceps-Needle	4.50
3449	487	O'Leary's Pessary	5.00	1938	165	Liebreich's	6.50
	589	Olecranon.		1936	165	Straight	1.50
3929	590	Apparatus for Fracture of		1939	165	Walton's, Self-Holding	2.50
2867	345	Olivary Bougie, Gum Elastic	.50	1919	163	Wilde's, Canulated	12.00
2864	345	Bougie, Whalebone	.75			Ophthalmic, Cataract, Iris Hooks:	
2877	345	Catheter, Gum Elastic	.50	1934	164	Culbertson's	12.00
3022	385	Catheter, Gum Elastic	.50	1921	163	Tyrrell's, Blunt	1.25
3031	386	Catheter, Tiemann's Velvet-eyed	1.50	1922	163	Tyrrell's, Sharp	1.25
1198	34	Olive Electrodes, each	.20	1944	167	Weber's	1.50
2707	308	O'Neal's Hæmorrhoidal Syringe	5.00			Ophthalmic, Cataract, Iris Knives:	
2645	299	Rectum Speculum	6.50	1920	163	Adams'	1.50
		Operating Cases:		1914	163	Double Edged	2.00
	62	Capital.		1905	163	Hayes' Knife-Needle	1.50
	56	General.		1913	163	Knife	1.50
	63	Major Surgery.		1916	163	Knife-Needle	1.50

FIG. PAGE.	PRICE.	FIG. PAGE.	PRICE.
Ophthalmic, Cataract, Iris Knives:		Ophthalmic, Cataract, "Soft," Extraction Instruments:	
1915 163	Knife, with Stop \$1.75	1971 } 173	Teale's Instrument, in Case \$5.00
1904 163	Sichel's 1.75	1973 }	
1906 163	Sickle-shaped 1.75	1968 173	Walton's Grooved Needle 2.00
Ophthalmic, Cataract, Iris Needles:		1969 173	Wecker's Canulated Needle 2.00
1907 163	Beer's 1.25	175	Ophthalmic, Enucleation or Extirpation of the Eyeball:
1966 172	Bradford's Twin 1.25	1985 175	Double Hook, Ball's 3.00
1910 163	Critchett's Hooked 1.25	1984 175	Forceps, Blitz's 3.00
1937 165	De la Roza's 1.75	1987 175	Forceps, Bull-dog 2.50
1905 163	Hayes' Knife-Needle 1.50	1986 175	Scissors 1.50
1933 164	Lanne's Forceps-Needle 4.50	1988 175	Spoon, Wells' 2.75
1912 163	Levi's 1.25	Ophthalmic, Foreign Body Instruments:	
1911 163	Luzardi's Hooked 1.50	1835 150	Carron de Villard's Needle 1.25
1908 163	Narrow, Straight 1.25	1836 150	Couching Needle 1.25
1909 163	Scarpa's Curved 1.25	1832 150	Daviel's Curette 1.25
1917 163	Wilde's Needle, Canulated 12.00	1833 150	Dix's Spud 1.25
1918 163	Wilde's Set, in One Handle 15.00	1177 32	Electro-Magnet 10.00
Ophthalmic, Cataract, Iris Scissors:		1177 32	Electro-Magnet and Cell 15.00
1925 164	Althof's Iridectomy 5.00	1989 176	Electro-Magnet, Bradford's 25.00
1930 164	Culbertson's Iriectomy 16.00	1834 150	Gouge 1.50
1923 164	Curved 1.50	1837 150	Hard Rubber Spoon ..... .75
1932 164	Hall's 6.00	1829 150	Knapp's Hook 2.00
1924 164	Maunoir's 1.50	1838 150	Knapp's Hook 2.00
1927 164	Noyes' 4.50	1840 150	Magnet, Gruening's 12.00
1929 164	Strawbridge's Keratome Scissors 10.00	1830 150	Pocket Gouge and Spatula 2.50
1926 164	Straight 1.50	1839 150	Pocket Spud and Needle 2.50
1928 164	Wecker's Iridotomy 8.00	1831 150	Spatula, German Silver 1.25
1931 164	Welker's Iridectomy Instrument 12.00	1831 150	Spatula, Hard Rubber ..... .75
1918 163	Wilde's Canulated Set 15.00	1785 146	Ophthalmic Ice Bag, Turnbull's 2.50
Ophthalmic, Cataract, Keratomes:		1792b 147	Ophthalmic, Lachrymal Canula ..... .50
1897 162	Agnew's Iridectomy Knife 1.75	1792c 147	Lachrymal Canula ..... .50
1903 162	Baader's Linear Knife, Left 1.75	1992 178	Lachrymal Canula, Prince's, per pair, 1.50
1902 162	Baader's Linear Knife, Right 1.75	1794 147	Lachrymal Canula, Wecker's 1.25
1902 162	Beer's 1.50	1796 147	Lachrymal Catheter, Speir's 1.00
1893 162	Beer's 1.50	Ophthalmic, Lachrymal (Canalicula) Dilators:	
1894 162	Beer's 1.50	4402 769	Blitz's 4.00
1889 162	Desmarre's Paracentesis Trocar 1.75	1793 147	Galezowsky's 2.50
1898 162	Graefe's Linear Knife 1.50	1788 147	Weber's 1.00
1887 162	Jaeger's Angular 1.75	1789e 147	William's 1.00
1888 162	Jaeger's Straight 1.50	Ophthalmic, Lachrymal (Canalicula) Knives:	
1899 162	Liebreich's Linear Knife 1.50	1809 148	Agnew's 1.75
1900 162	Noyes' Linear Knife 1.50	1799 148	Beaumont's 8.00
1890 162	Paracentesis Needle, Broad 1.25	1808 148	Bowman's 1.75
1891 162	Paracentesis Needle, Extra Broad 1.25	1807 148	Bowman's Director, for Knife ..... .50
1896 162	Section Knife, Angular 1.50	1802 148	Girard Teulon's 8.00
1895 162	Section Knife, Straight 1.50	1801 148	Greenslade's 8.00
1943 167	Weber's, Angular and Concave 2.50	1800 148	Jaeger's Bistoury Caché 8.00
Ophthalmic, Cataract, Lens Spoons:		1811 148	Liebreich's, and Probe 2.00
1955 168	Bowman's Concave 1.75	1805 148	Noyes', Movable 4.00
1953 168	Bowman's Flat 1.50	1804 148	Noyes', Plain 1.75
1957 168	Critchett's Concave 1.50	1804 148	Noyes'-Stillings 1.75
1956 168	Critchett's Flat 1.50	1813 148	Parker's Fistula Lachrymalis 1.50
1950 168	Graefe's Tractor 1.75	1812 148	Petit's Fistula Lachrymalis 2.00
1952 168	Hard Rubber ..... .75	1810 148	Prout's 2.50
1960 168	Lens Forceps 3.00	1803 148	Stillings' 1.50
1959 168	Levi's, Fenestrated 1.50	1798 148	Weber's, Curved 1.75
1954 168	Noyes' 1.75	1797 148	Weber's, Half Curved 1.75
1958 168	Silver, and Cystotome 2.50	Ophthalmic, Lachrymal Probes:	
1951 168	Tortoise Shell 2.00	1786 147	Anel's ..... .50
Ophthalmic, Cataract Needles:		1787 147	Bowman's, Hard Rubber, each ..... .50
1976 174	Beer's Straight 1.25	1787 147	Bowman's, Silver, each ..... .75
1978 174	Bowman's 1.75	1787 147	Bowman's, Silver, per set 3.00
1974 174	Couching 1.25	1790 147	Brewster's Cupped Sound 2.50
1979 174	Curved 1.25	1795 147	Levi's 2.00
1977 174	Narrow, Straight 1.25	1791 147	Theobald's, per set 4.00
1975 174	Walton's Reclination 1.25	1789a 147	William's, each ..... .75
Ophthalmic, Cataract, Ophthalmostate, see Ophthalmic, Cataract: Fixators.		1789 147	William's, per set, complete 3.50
Ophthalmic, Cataract, "Soft," Extraction Instruments:		1924 164	Ophthalmic, Lachrymal Scissors, Maunoir's, 1.50
1970 173	Blanchet's Instrument 2.25	Ophthalmic, Lachrymal Styles:	
1272 173	Bowman's Instrument 4.50	1792b 147	Canulated, Silver ..... .75
1967 173	Levi's Needle, with an Eye 1.25		

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Ophthalmic, Lachrymal Styles :				Ophthalmic, Pterygium and Pannus :	
1792d	147	Hard Rubber	\$0.50	1885	159	Knapp's Caustic Holder	\$1.00
1792a	147	Silver	.50	1886	159	Prince's Divulsion Hook	1.50
1792c	147	Silver, Canulated	.75			Ophthalmic, Soft Cataract, Extraction In-	
1789d	147	William's, Silver	.50			struments :	
1789e	147	William's, Silver	.50	1970	173	Blanchet's Instrument	2.25
		Ophthalmic, Lachrymal Syringes :		1972	173	Bowman's Instrument	4.50
1823	149	Agnew's	5.00	1967	173	Levi's Needle	1.25
1820	149	Anel's, Hard Rubber, with 1 Gold and		1971	173	Teale's Instrument, in Case	5.00
		1 Silver Point, in Case	5.00	1968	173	Walton's Grooved Needle	2.00
1820	149	Anel's, Silver, with 2 Gold and 1 Silver		1969	173	Wecker's Canulated Needle	2.00
		Point, in Case	12.00			Ophthalmic, Speculums :	
1826	149	Knapp's	4.00	1856	152	Bowman's	4.00
1821	149	McFarlan's	3.00	1994	178	Bradford's	
1993	178	Prince's	1.00	1851	151	Critchett's, Over Nose	3.00
1991	178	Tansley's, Silver	15.00	1852	151	Critchett's, Over Temple	2.50
		Ophthalmic, Lachrymal, Nasal Duct and		1845	151	Galante's	4.00
		Sac, Cauterizing and Obliterating :		1842	151	Graefe's	2.50
1818	149	Desmarre's Caution Iron	3.00	1853	151	Hart's	1.50
1819	149	Desmarre's Many-pronged Hook	2.00	1846	151	Landolt's	4.00
1815	149	Gensoul's Canula	3.00	1848	151	Liebold's	2.50
1817	149	Knapp's Caustic Holder	1.00	1850	151	Liebreich's	2.50
1816	149	Manfredi's Speculum	5.00	1844	151	Noyes' Improved	4.50
1814	149	Noyes' Gouge	2.50	1844	151	Noyes' Improved, Gilt	5.00
		Ophthalmic, Operating Sets :		1843	151	Noyes' Plain	1.75
	179	Agnew's	66.50	1841	151	Plain Wire	.75
	179	Ayres', Large	84.65	1847	151	Schwatka's	2.50
	179	Ayres', Small	49.25			Tiemann's	3.50
	179	Compact	28.00		153	Ophthalmic, Strabotomy :	
	180	Graefe's	46.00		154	Agnew's Strabismus Hook	1.25
	180	Gruening's	71.00	1880	154	Angular Strabismus Scissors	1.50
	180	Knapp's	73.75	1879	154	Blunt-pointed Strabismus Scissors,	
	181	Mittendorf's	50.00			Curved	1.50
	181	Noyes'	70.00	1875	154	Critchett's Strabismus Hook	1.25
	179	Strabismus Set	9.50	1877	154	Curved Strabismus Forceps	1.50
	181	Webster's New York Polyclinic Eye		1871	154	Graefe's Large Strabismus Hook	1.25
		Set	72.00	1872	154	Graefe's Small Strabismus Hook	1.25
145		Ophthalmic, Palpebral.		1882	157	Prince's Advancement Forceps	2.00
		Ophthalmic, Palpebral, Entropium Forceps:		1883	157	Prince's Needle for Advancement and	
1766	145	Cross-Bar	2.25			Canthoplasty	2.50
1764	145	Desmarre's	3.00	1878	154	Probe-pointed Curved Scissors	1.50
1760	145	Knapp's	4.00	1873	154	Sedillot's Double Hook	1.50
1765	145	Laurence's	3.00	1876	154	Strabismus Hook-Bistoury	2.50
1768	145	Prout's	4.00	1881	154	Straight Strabismus Forceps	1.25
1762	145	Rochrich's	3.00	1870	154	Theobald's Crotchet Strabismus Hook,	1.50
1761	145	Snellen's	2.50	1874	154	Wecker's Strabismus Hook	1.25
1769	145	Stoke's	3.00	1869	154	Wecker's Strabismus Hook, Double ..	4.00
1763	145	Tiemann's	7.00	1784	146	Ophthalmic, Suture Needle, per dozen	1.50
1767	145	Tiemann's	7.00			Ophthalmic, Suture Needle Holders :	
		Ophthalmic, Palpebral, Epilating Forceps :		1781	146	Knapp's	3.50
1773	146	Cilia	1.00	1783	146	Prout's	3.50
1775	146	Gruening's	1.75	1782	146	Sand's	4.50
1776	146	Henry's	2.50		175	Ophthalmic, Tattooing :	
1774	146	Piffard's	1.50			Ophthalmic, Tattooing Needles :	
1769	145	Ophthalmic, Palpebral: Lid Compressor,		1983	175	Agnew's	2.00
		Stoke's	3.00	1980	175	Agnew's Spring Tattoo	4.50
1771	145	Lid Forceps, Carron de Villard's	4.00	1982	175	Baader's	2.00
1864	151	Lid Holder, Desmarre's	1.75	1981	175	Grooved	2.00
1855	151	Lid Holder, Desmarre's	1.75	1754	143	Ophthalmophantome	20.00
1849	151	Lid Holder, Noyes'	1.75	1744	134	Ophthalmoscope, Dudley's	30.00
1770	145	Lid Plate, Jaeger's, Hard Rubber	1.00	1749	140	Knapp's Double Disk	35.00
1770	145	Lid Plate, Jaeger's, Tortoise Shell ..	2.00	1752	143	Knapp's Metric System	32.00
1777	146	Scalpel	1.50	1743	134	Knapp's Single Disk	20.00
1778	146	Scalpel	1.50	1742	134	Liebreich's	4.50
1779	146	Scalpel	1.50	1742	134	Liebreich's, Extra Fine	7.50
1780	146	Scarificator, Desmarre's	1.50	1747	137	Loring's, 7 Lenses	9.00
1772	146	Trichiasis Forceps, Ratti's	3.00	1748	138	Loring's, 12 Lenses	14.00
	159	Ophthalmic, Paracentesis Corneæ :		1751	141	Loring's Double Disk	32.00
1890	162	Broad Needle	1.25	1750	141	Loring's Single Disk	28.00
1889	162	Desmarre's Trocar	1.75	1745	134	Loring's Students'	22.00
1891	162	Extra Broad Needle	1.25		134	On the Use of the.	
	159	Ophthalmic, Pterygium and Pannus :				Ophthalmoscopic Accessories :	
1884	159	Chadwick's Scissors	6.00	1746	135	Lens Holder, Noyes'	6.00
1303	77	Child's Caustic Holder	2.50	1756	144	Perimeter, Carmalt's	

FIG.	PAGE.	PRICE.
Orthopædic, Diseases of the Joints :		
Knee-Joint Apparatus :		
	656	Sayre's Splint, Manner of Applying.
4096	659	Shaffer's Extension Splint.....\$50. to 60.00
4102	661	Stillman's Bracket and Sector..... 10.00
4103	661	Stillman's Extension Splint,
		35.00 to 40.00
	663	Shoulder-Joint Apparatus :
4117	668	Stillman's Cable Splint.
4122		
	706	Orthopædic, Paralytic and Spastic Deformities :
4196	707	Hemiplegia Apparatus..... 30.00 to 40.00
4197	708	Paraplegia Apparatus 35.00 to 70.00
4198	708	Partial Paralysis of Leg and Thigh Apparatus 25.00 to 30.00
4199	708	Smith's (Stephen) Paralysis Apparatus 40.00 to 50.00
4200	709	Support for Weak Legs, for Adults,
		35.00 to 70.00
4200	709	Support for Weak Legs, for Children,
		25.00 to 35.00
4203	710	Short Leg Patten 9.00
	709	Valgus Ankle, Weak Ankle :
4201	709	Detmold's Ankle Spring--- 4.00 to 6.00
4202	710	Weak Ankle Brace 5.00 to 10.00
4204	710	Weak Ankle Brace and Extension
		for Short Leg 18.00
	710	Wrist, Contracted :
4205	710	Apparatus for 20.00 to 30.00
	711	Wrist Drop :
4206	711	Hudson's Apparatus for... 25.00 to 40.00
	712	Writer's Cramp.
		Writer's Cramp Apparatus :
4216	713	Apparatus 6.00
4211	713	Charcot and Casenave's..... 15.00
4213	713	Charrière's..... 9.00
4217	713	Index and Middle Finger..... 5.50
4212	712	Mathieu's, for Two Fingers..... 6.00
4215	713	Mathieu's, for Three Fingers..... 6.00
4210	712	Nussbaum's Bracelet 6.00
4214	713	Pince Porte Plume..... 5.00
4209	712	Velpeau's 10.00
	713	Orthopædic, Paralytic, Spastic and Rachitic Deformities :
	720	Bowed Tibia.
4231	720	Brace for Correcting 12.00 to 18.00
	713	Genu Valgum or Knock Knee :
		Genu Valgum or Knock Knee Apparatus :
4218	715	Brace 30.00 to 40.00
4222	717	Roberts' Brace 30.00 to 40.00
4220	716	Stillman's Apparatus 30.00 to 40.00
4219	716	Trueheart's Brace 35.00 to 40.00
4221	717	Wilcox's Brace 30.00 to 35.00
	721	Genu Valgum, Varum, Bowed Tibia :
	721	Mechanical Treatment.
	722	Operative Procedures.
4232	723	Roberts' Electro-Osteotome.....
4233	724	Roberts' Protecting Retractors...
	718	Genu Varum or Bow-Leg.
	718	Genu Varum or Bow-Leg Apparatus :
4225	718	Bigg's Brace, each 6.00
4223	718	Brace, with Thigh Band, per pair..
		25.00 to 30.00
4230	720	Bruce's Apparatus, per pr., 20.00 to 24.00
4226	719	Gross' Brace, per pair 25.00 to 35.00
4229	720	Harris' Spring, per pair 4.00
4224	718	Short Brace 10.00 to 15.00
4227	719	Stillman's Brace, Long, per pair..
		30.00 to 40.00
4228	719	Stillman's Brace, Short .. 20.00 to 25.00
	677	Spinal Column.
	704	Spinal Cord.

FIG.	PAGE.	PRICE.
	678	Orthopædic, Spinal Diseases and Deformities.
	677	Spinal Curvature.
See also Spinal Braces.		
3750	538	Osborn's Obstetrical Forceps \$8.00
	114	Osteoclasis.
1644	114	Osteoclast, Poore's 35.00
1644	114	Rizzoli's 35.00
	99	Osteological.
1548	99	Human Skeleton :
		Female Pelvis, with Ligaments and Foetal Head 20.00
		Female Pelvis, without Ligaments,
		Foot, Articulated, on Catgut..... 3.00
		Hand, Articulated, on Catgut..... 3.00
		Skeleton, Articulated, Grade 1..... 60.00
		Skeleton, Articulated, Grade 2..... 50.00
		Skeleton, Articulated, Grade 3..... 45.00
		Skeleton, Disarticulated 45.00
		Skull, 1 Cut 10.00
		Skull, 2 Cut 14.00
		Skull, 5 Cut 20.00
		Skull, Disarticulated 20.00
		Skull, Plain 10.00
Osteophor (Bone-Holding Forceps) :		
1569	101	Farabeuf's Osteophor 7.00
1565	101	Ferguson's Lion-jaw Forceps 3.00
1567	101	Ferguson's Lion-jaw Forceps 3.00
1570	101	Hamilton's Osteophor 4.00
See also Sequester Forceps.		
1607	105	Osteotome, Heine's.....300.00
1642	113	Hutchison's..... 6.00
1640	112	Macewen's 6.00
		Macewen's Set of 3 Osteotomes and 3
		Chisels, in Case 36.00
1643	113	Poore's, each 6.00
		Smith's 6.00
	100	Osteotomy:
1575	102	Chisel 1.25
1577	102	Chisel, Darby's Set..... 7.00
1578	102	Chisel, Linhard's Knife-Chisel 1.50
1639	112	Chisel, Macewen's 6.00
1549	99	Costotome or Rib Shears 6.00
	109	Osteotomy Drills :
1625	109	Brainard's, Set of 5..... 3.50
1619	108	Buck's 3.00
1630	109	Buck's 5.00
1624	108	Drill..... 1.75
1622	108	Drill, with Guard 7.00
1627	109	Gaillard's 2.50
1629	109	Hamilton's..... 7.00
1626	109	Howard's 7.00
1631	109	Marshall's Osteotrite..... 2.50
1628	109	Tiemann's Drill Stock and Drills 7.00
4002	619	Wyeth's, per set 7.00
	106	Osteotomy, Exsection, see also Osteotomy :
		Resection and Exsection.
		Exsecting Set..... 65.60
	103	Osteotomy, Forceps and Rongeurs :
1599	103	Curved Rongeur 3.50
1597	103	Darby's Rongeur and Bone Holder... 4.00
1566	101	Hamilton's Serrated Bone Cutter 10.00
1596	103	Heuel's Bone Forceps 3.50
1590	103	Hoffman's Gouge Forceps 4.00
1595	103	Isaac's Bayonet Bone Forceps, Large.. 7.00
1595	103	Isaac's Bayonet Bone Forceps, Med'm. 5.00
1595	103	Isaac's Bayonet Bone Forceps, Small . 4.00
1589	103	Liston's Bone Forceps, I..... 3.00
1589	103	Liston's Bone Forceps, II..... 2.50
1591	103	Liston's Bone Forceps, Flat Curved... 3.50
1592	103	Liston's Bone Forceps, Knee Bent.... 3.50
		Liston's Bone Forceps, Knee Bent, Lge. 7.00
1594	103	Liston's Bone Forceps, Large. 4.00 to 7.00
1620	108	Post's Rongeur 3.00
1593	103	Satterlee's Bone Forceps, Large..... 3.00

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Ovariotomy, Pedicle Clamps :		2671	305	Parker's Vaginal and Rectal Syringe	\$3.00
3702	528	Wells', Set of 3, and Levers.....	\$25.00	3417	481	Vaginal and Rectal Syringe.....	3.00
3703	528	Wells' Clamp Forceps	8.00			Parkinson's Inhaler	14.00
		Ovariotomy, Pedicle Forceps :		2277			
3696	526	Wells', Angular	5.00		226	Parry's Tooth Forceps	2.00 and 2.75
3697	526	Wells', Straight	5.00	2282			
3698	526	Wells', T Shaped	5.00	3313	456	Parrott's Needle Forceps.....	5.00
		Ovariotomy, Sac Forceps :		4198	708	Partial Paralysis of Leg and Thigh Apparatus	25.00 to 30.00
3693	525	Thomas'	3.50		586	Passive Motion.	
3695	525	Wells'	4.50			Patella, see Fracture of Patella.	
3692	525	Wilcox's	5.50	2881	346	Pathfinder, Eldridge's.....	35.00
		Ovariotomy Trocars :		2882	346	Tiemann's-Eldridge's.....	3.50
1725	127	Dunster's	6.00	4203	710	Patten, to Elevate a Short Leg.....	9.00
1723	127	Emmet's	4.50	1486	94	Pean's Artery Clamp Forceps	2.25
1722	127	Fitch's, Nos. 1, 2, 3.....	14.00	3732	533	Peaslee's Perineum Needles, Detachable Handle	3.00
3691	524	Hanks'	4.50			Perineum Needles, Detachable Handle	3.00
1726	128	Tait's	18.00	3839	561	Perineum Needles, Right and Left.....	1.75
		Tait's, Plain	4.50			Pessary, Ring.....	.50
1721	127	Thomas'	20.00		470	Set of Uterine Instruments	60.00
1724	127	Warren's	10.00	3535	494	Stem Pessary	1.50
1720	127	Wells'	10.00	3569	499	Uterine Dilators, per set	6.50
1720	127	Wells' Curved	11.00	3613	505	Uterotome, 1 Blade.....	4.50
1727	128	Wells' Latest	20.00			Uterotome, 2 Blades.....	6.50
						Peck's Bladder Syringe	2.50
4003	619	Packard's Splint.....	5.50			Pelvimeter, Baudelocque's	8.00
2620	294	Paine's Nasal Feeding Tube	1.00			Byford's	8.00
		Palatorrhaphy, see Staphylorrhaphy and				Colin's	8.00
		Langenbeck's Uraniscoplastic Instruments.		3227	444	King's	4.00
		Palmer's Stethoscope.....	7.50			Schultz's	8.00
3594	503	Uterine Dilator	5.00			Penis Congestor	5.00
3598	503	Uterine Dilator, 2 Sizes, Latest	5.00	2434	254	Penn's Catgut Ecraseur	5.00
		Palpebral, see Ophthalmic : Palpebral.		3651	512	Catgut Ecraseur	5.00
1866	152	Parard's Pique	1.50		7	Percussion, Mediate :	
	159	Pannus, see also Ophthalmic : Pterygium and Pannus.		1054	7	Echroscope, Speir's.....	6.00
1237	39	Paquelin's Thermo-Cautery		1053	7	Percussion Hammer, Winterich's.....	2.50
	126	Paracentesis.		1050	7	Percussor, Flint's, H. R. Handle	.75
		See Aspirator, Ovariotomy Trocar, Trocar.		1050	7	Percussor, Flint's, Steel Handle	1.00
		Paracentesis Corneæ, see Ophthalmic : Paracentesis Corneæ.		1052	7	Percussor, Whalebone Stem	1.00
	390	Paracentesis Vesicæ.		1046	7	Pleximeter, Flint's	.85
		See also Bladder: Puncture of the, Tapping the.		1051	7	Pleximeter, Gerne's	2.50
2311	231	Parallel Harelip Forceps	9.00	1048	7	Pleximeter, Glass.....	.50
	706	Paralytic and Spastic Deformities.		1046	7	Pleximeter, Hard Rubber	.85
		See also Orthopædic : Paralytic and Spastic Deformities.		1047	7	Pleximeter, Hoffmann's	1.25
4197	708	Paraplegia Apparatus.....	35.00 to 70.00	1049	7	Pleximeter, Ivory	1.00
4333	757	Park's Aluminium Trachea Tube	6.00		182	Perforating Lobe of Ear :	
	73	Antiseptic Pocket Set	28.00	1995	182	Trocar for	1.50
2523	275	Artificial Larynx				Perforating Scissors, see Obstetrical : Perforators.	
2012	184	Electric Otoscope		1756	144	Perimeter, Carmalt's.....	
1498	95	Parker's Amputating Knife	5.50			Perineal Lithotomy, see Lithotomy : Perineal.	
1460	92	Artery Needles (Mott's)	2.75		390	Puncture of Bladder :	
1528	97	Capital Saw	5.00	3048	391	Harrison's Trocar	11.00
2914	351	Catheter Syringe (Dick's)	3.50	2992	373	Tourniquet, Otis'	5.00
1300	77	Compound Catheter, Plated	2.50		559	Perineorrhaphy :	
3018	384	Compound Catheter, Silver	4.50	3836	561	Agnew's Forceps and Adjuster	2.50
1300	77	Compound Catheter, Silver	4.50	3835	561	Agnew's Needles and Holder.....	4.50
1813	148	Fistula Lachrymalis Knife	1.50		562	Agnew's Set of Instruments for Ruptured Perineum	24.35
	59	General Operating Set.....	104.90	3840	561	Ashton's Perineum Needle	1.00
2370	237	Mouth Gag	2.50	3847	562	Brickell's Perineal Stay	.75
1335	80	Needle Holder	4.00	4340	758	Hanks' Perineal Needle	1.75
3845	562	Perineum Needle and Clamp	.50	3838	561	Helical Needle	1.75
3842	561	Perineum Needles and Handle	5.00			Jenks' Knife	2.00
	67	Pocket Set	18.00			Jenks' Scissors	4.50
	67	Pocket Set, Fine	25.00	3834	560	Marcy's Perineal Safety Pin	.50
1729	128	Rectum Trocar	4.50	3846	562	Munson's Quill Suture Stay, per pair,	.75
1550	100	Retractors, per pair	1.50	3845	562	Parker's Perineum Needle and Clamp,	.50
1528	97	Saw, Capital	5.00	3842	561	Parker's Perineum Needles and Handle	5.00
2922	352	Urethral Tube	.50	3839	561	Peaslee's Perineum Needles, Detachable Handle	3.00
3397	476	Uterine Applicator, Velvet-Eyed	1.25				

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
Perineorrhaphy:			Pessary:		
3841	561	Peaslee's Perineum Needles, Right and Left	3443	486	Inflated
		\$1.75			\$0.50
3837	561	Shot Compressor	3526	493	Kinloch's Anteversion
		2.50			1.25
3843	561	Skene's Perineum Needle	3525	493	Kinloch's Prolapsus of Bladder
		1.75			2.50
3844	561	Usual Perineum Needle	3543	495	Kinloch's Retroflexion
		.75			2.00
2110	197	Periosteotome, Buck's	3544	495	Kinloch's Retroflexion
		2.50			1.25
1584	102	Sands'	3450	487	McIntosh's Uterine Supporter
		2.50			5.00
1583	102	Sayre's	3536	494	Mossman's Intra-Uterine Stem
		2.00			5.00
1586	102	Whitehead's Hoe	3468	489	Noeggerath's
		1.50			2.00
2332	233	Whitehead's Hoe	3449	487	O'Leary's
		1.50			5.00
Periosteum Levators:					Peaslee's Ring
					.50
1581	102	Goodwillie's, Curved	3535	494	Peaslee's Stem
		2.00			1.50
1582	102	Goodwillie's, Half Curved	3549	496	Perry's Flexion
		2.00			5.00
1580	102	Hamilton's	3439	486	Ring, Elastic
		1.50			.50
4380	765	Sharp Lever			Ring, Hard Rubber
		2.00			.50
4379	765	Van Arsdales's Elevators, Set of 3	3442	486	Ring, Inflatable
		6.00			.50
3331	458	Perry's-Abbott's Wire Cutter	3443	486	Ring, Inflated
		6.00			.50
3549	496	Instrument for Flexion of Uterus	3465	489	Ring, Metal
		5.00			.50
Pes Equinus, Planus, &c., see Orthopædic: Deformities of the Feet.			3471	489	Ring, Wilhoff's
					.50
3455	487	Pessary, Babcock's, with Belt	3446	486	Rozer's
		15.00			6.00
3529	494	Ball's Stem	3537	495	Sims' Stem
		1.50			2.00
3519	493	Bozeman's-Smith's	3551	496	Sims' (H. Marion) Stem
		1.00			1.75
3459	488	Bozeman's Vaginal Support	3500	491	Skene's Cystocele
		2.00			2.00
3489	490	Brown's	3485	490	Sleigh
		.75			.75
3510	492	Buttles'	3508	492	Smith's
		.50			.50
3511	492	Buttles'	3527	494	Stem
		.50			.50
3482	490	Campbell's, Soft Rubber	3531	494	Stem
		.75			.75
3523	493	Carroll's, Retroflexion	3532	494	Stem
		.75			.50
3478	490	Chamberlain's	3477	489	Taliaferro's Retro Displacement
		1.50			.75
3479	490	Chamberlain's	3475	489	Taliaferro's Universal
		1.50			.75
3541	495	Chambers', Stem	3513	493	Thomas' Anteversion
		3.00			2.00
3522	493	Cole's, Anteversion	3515	493	Thomas' Anteversion
		3.00			1.25
3530	494	Cole's, Galvanic	3516	493	Thomas' Anteversion
		2.00			1.25
3521	493	Cole's, Retroversion	3518	493	Thomas' Anteversion
		3.00			1.25
3486	490	Coleman's	3524	493	Thomas' Anteversion
3487	490	Coleman's			1.25
		.40	3491	491	Thomas' Anteversion
3528	494	Conant's Intra-Uterine Stem			1.25
		3.00	3493	491	Thomas' Anteversion
					2.50
			3504	492	Thomas'-Cutter's Anteversion
					2.50
			3506	492	Thomas'-Cutter's Anteversion
					2.50
			3505	492	Thomas'-Cutter's Anteversion, with Cervical Rest
					3.50
3444	486	Concave, Hard Rubber	3458	487	Thomas'-Cutter's Cup
		.50			3.50
3534	494	Coxeter's, Stem	3503	492	Thomas'-Cutter's Retroversion
		1.50			2.50
3502	492	Cutter's, with Belt	3507	492	Thomas'-Cutter's Retroversion, with Cervical Rest
		2.50			3.50
3440	486	Cutter's Cup, with Belt	3533	494	Thomas' Galvanic Stem
		2.50			1.50
3457	487	Cutter's Ring	3545	495	Thomas' Intra-Uterine Stem, Ante- flexion
		2.50			2.50
3539	495	Donaldson's Flexion	3492	491	Thomas'-Hewitt's Retroversion
		2.00			1.00
3456	487	Donaldson's Uterine Supporter	3514	493	Thomas' Retroflexion, Hard Rubber
		2.50			.75
3542	495	Edward's Stem	3514	493	Thomas' Retroflexion, Soft Rubber
		3.00			1.00
3465	489	Emmet's Ring	3512	492	Thomas' Retroversion
		.50			.75
3501	491	Emmet's-Smith's	3447	486	Tiemann's Uterine Supporter
		.50			5.00
3481	490	Fowler's	3476	489	Todd's
		1.25			3.00
3494	491	Fowler's Bow	3467	489	Trask's
		1.75			.75
3480	490	Frazer's	3469	489	Trask's
		1.25			1.50
3499	491	Gebrung's Anteversion	3448	496	Van de Warker's Anteversion, with Stem
		.50			1.75
			3550	496	Van de Warker's Retroflexion
					1.75
3463	488	Globe, Glass	3520	493	Von Ramdohr's
		.50			1.50
3463	488	Globe, Hard Rubber	3547	496	Wallace's (Spring Tent)
		1.00			1.50
3464	488	Globe, Silver	3546	495	Weber's
		8.00 to 10.00			4.50
3517	493	Hanks' Galvanic	3471	489	Willhoff's
		1.50			.50
3470	489	Hewitt's (Graily)	3538	495	Willhoff's Stem
		1.00			.75
3488	490	Hewitt's (Graily)	3497	491	Woodward's
		1.00			1.25
3483	490	Hewitt's	3498	491	Woodward's
		1.00			1.25
3496	491	Hitchcock's Anteversion	3474	489	Zwank's (Hystrophore)
		.75			1.50
3472	489	Hodge's Closed Lever	3047	390	Pessary Catheter, Harrison's
		.50			4.00
3473	489	Hodge's Closed Lever	3466	489	Pessary Introducer, Sims'
		.50			8.00
3490	490	Hodge's Closed Lever	2753	316	Peter's Hernia Director
		.50			2.00
3484	490	Hodge's Horseshoe	3112	415	Substitute for Wrist and Ankle Band, Urethrotome
		.50			15.00
3461	488	Hofmann's Pelvic	2966	363	Urethrotome
		1.50			6.00
3454	487	Hornby's	3147	423	Peterson's Rectal Colpeurynter
		6.00			1.50
3495	491	Hunter's	3147	423	Rectal Colpeurynter, with Stop-cock
		1.50			2.00
			1812	148	Petit's Fistula Lachrymalis Knife
3462	488	Hurd's Anteversion			2.00
		1.50			
3445	486	Inflatable Ball, with Stop-cock			
		1.00			
3442	486	Inflatable Ring, without Stop-cock			
		.50			

FIG.	PAGE.	PRICE.
3918	585	Petit's Fracture Box..... \$
1430	88	Spiral Tourniquet 2.00
		Phalanges, see Dislocation of Phalanges.
	247	Pharyngeal.
4325	756	Cohen's Antero-Posterior Pharyngeal Forceps 4.50
4330	756	Cohen's Powder Blower..... 2.00
2416	248	Holbrook Curtis' Post-Nasal Forceps, 4.50
2418	249	Lefferts' Anterior and Posterior Nasal Syringe 3.00
2432	254	Lefferts' Nasal Powder Insufflator..... 4.00
2417	249	Lefferts' Nasal Spray Apparatus 4.00
2419	250	Lefferts' Palate Hook 2.00
2415	248	Lefferts' Post-Nasal Curette 2.50
2434	254	Penn's Catgut Ecraseur 5.00
2414	248	Post-Nasal Forceps..... 4.50
		Troutman's Spoon..... 2.50
		Pharyngeal Medication, see Insuffla- tor and Spray.
	247	Pharyngoscopy.
	247	Pharyngotomy.
		Phelps' Abdominal Supporter 5.00
1451	91	Artery and Torsion Forceps..... 4.50
	395	Phimosis.
2837	337	Forceps, Cohn's..... 9.00
2830	336	Forceps, Fisher's 3.00
2836	337	Forceps, Girdner's..... 3.50
2832	336	Forceps, Henry's 4.50
2827	336	Forceps, Hutchison's..... 2.25
2834	336	Forceps, Knox's 4.00
2833	336	Forceps, Levis' 3.50
2829	336	Forceps, Nelaton's 5.00
2831	336	Forceps, Roger's 3.00
2835	336	Forceps, Skillern's..... 2.50
2825	335	Probe and Spatula..... 1.00
2826	335	Ring, Ross' (Circumcision) 1.00
2828	336	Scissors, Baruch's (Circumcision)..... 2.50
2838	337	Scissors, Curved on Flat 1.50
2839	337	Scissors, Taylor's..... 5.00
2840	337	Syringe, Taylor's..... 1.50
	115	Phlebotomy.
		Phlebotomy Lancets:
1649	115	Spring Lancet 1.50
1648	115	Spring Lancet, Button..... 2.50
1647	115	Spring Lancet, Tiemann's..... 2.50
1646	115	Thumb Lancet, Broad Pointed..... .75
1645	115	Thumb Lancet, Spear Pointed, Evans', 1.00
1645	115	Thumb Lancet, Spear Pointed, Plain, .50
1645	115	Thumb Lancet, Spear Pointed, Tie- mann's..... .75
1152	22	Physicians' Hand Bag, according to size, 4.00 to 5.00
		Vial Cases, see Medicine Pocket Cases.
3132	421	Physick's Gorget, 2 Blades 6.50
	18	Physiological Experiments:
		Armamentarium, Flint's..... 70.00
1144	19	Blowpipe, 2 Points, Mouth-piece and Stop-cock 2.50
1138	19	Blunt Hooks, for Roots of Spinal Nerves, each 1.25
1132	18	Bone Forceps, for Opening Spinal Canal 3.50
1133	18	Bone Forceps, with Rings 3.50
1134	18	Bull-dog Forceps, for Drawing-out Stomach 2.50
1136	19	Cartilage Knife, Stout..... 1.50
1137	19	Catheter, for Catheterizing Heart..... 1.00
1143	19	Dissecting Forceps, Long 1.00
1142	19	Dissecting Forceps, Medium..... .75
1141	19	Dissecting Forceps, Small..... .75
1129	18	Drill, Medulla Oblongata..... 1.75
1130	18	Forceps, with Catch, for Extirpating Spinal Accessory Nerve 2.00
1131	18	Gastric Fistula Tube, No. 1 1.50

FIG.	PAGE.	PRICE.
		Physiological Experiments:
1131	18	Gastric Fistula Tube, No. 2 \$2.50
1128	18	Hey's Saw 1.75
1139	19	Knives, for Intra-Cranial Division of Root of Fifth Nerve, each..... 1.50
1145	19	Lifting Back Saw, Large 4.00
1145	19	Lifting Back Saw, Medium 3.00
1145	19	Lifting Back Saw, Small 2.50
1140	19	Piques, for Irritation of Floor of Fourth Ventricle, each..... 2.50
1127	18	Portal Vein Ligator 1.75
1135	18	Probe-pointed Scissors 1.25
		Pierce's Obstetrical Forceps 7.50
1069	11	Piesmeter, Beard's 3.50
1675	120	Piffard's Acne Lance and Comedone Extrac- tor 2.50
1674	120	Comedone Extractor ..... .75
1083	13	Cutisector 5.00
1681	120	Cutisector 5.00
1691	121	Dermal Curette, each 2.25
1685	121	Epilating Forceps 1.50
1774	146	Epilating Forceps 1.50
2893	347	Fossal Bougie à Boule ..... .50
2890	347	Fossal Stricture Knife..... 10.00
1678	120	Grappling Forceps..... 3.00
4023	626	Grappling Forceps..... 3.00
1686	121	Irido-Platinum Needle..... 1.00
2894	347	Meatometer..... 1.50
2892	347	Meatotome..... 2.00
1680	120	Milium Needle 1.25
1009a	3	Measuring Pipette..... .50
1009b	3	Fermentation Test ..... .50
1679	120	Scarifying Spud 1.25
1691	121	Sharp Spoon, each..... 2.25
1684	121	Tattooing Instrument 4.50
		Urine Test Apparatus..... \$3.50
1011c	3	Water Oven Attachment 1.50
1011d	3	
3690	523	Pilcher's Aseptic Scalpel..... 1.50
2543	278	Bronchotome 6.00
2537	277	Supra-Sternal Retractor 2.50
2540	277	Tracheotomy Retractor 2.00
2745	312	Pile Bougie and Prolapsus Ani Supporter .. 1.25
2747	312	Bougie, Bolton's 1.25
2748	312	Bougie, Reed's..... 1.25
2744	312	Bougie, Swift's..... 1.50
2746	312	Bougie, Trousseau's..... 2.75
		See also Prolapsus Ani Supporter.
		Clamp, see Hemorrhoidal Clamp.
		Needle, see Hemorrhoidal Needle.
2708	308	Scissors, Angular..... 1.50
2709	308	Scissors, Bush's..... 1.50
		Syringe, see Hemorrhoidal Syringe.
4214	713	Pince Porte Plume..... 5.00
		Pin Conductor, Buck's..... 1.00
2316	231	Conductor, Buck's, Slide Catch 1.75
1327	80	Conductor, Heuel's..... 1.00
2317	231	Conductor, Post's 1.00
1326	80	Conductor, Post's 1.00
2319	231	Harelip, Removable Point..... .50
2729	310	Transfixion, Hemorrhoidal..... .25
2318	231	Plastic, per 100 ..... .40
		Suture ..... .40
1140	19	Pique, for Irritating Floor of Fourth Ven- tricle 2.50
1866	152	Pamard's 1.50
2538	277	Pitha's Tracheotome and Dilator 3.50
3795	548	Placenta Forceps..... 2.50
		Bozeman's 3.00
		Loomis' 6.00
		Munde's..... 3.00
		See also Embryotomy Forceps.
547		Placenta Prævia.
		See also Uterine Dilators.

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
1445	91	Plain Artery Forceps.....			
	65	Minor Operating Set.....			
1841	151	Wire Eye Speculum.....	1274	70	Pocket Instruments:
		Plaster, Adhesive, per yard.....			Tiemann's Patent Catch, "A":
		Moleskin, per yard.....			Blades, each.....
	572	Paris Bandage.....	1276	71	Handle, each.....
	573	Paris Dressing.....			Tiemann's Patent Catch, "B":
		Paris Shears, see Bandage Shears.....			Blades, each.....
2318	231	Plastic Pin, per 100.....	2385	239	Handle, each.....
1692	122	Platinum Cup, Lente's.....			Tongue Depressor.....
		Pleximeter, see Percussion, Mediate.....	1424	87	Pocket Instruments, Double, Plain Shell
2560	281	Pneumatic Apparatus, Fraenkel's.....			Handles.....
2564	281	Tobold's.....			Any other combination, same price.
2561	281	Waldenburg's.....			Pocket Instruments, Double, Slide Catch,
2565	281	Pneumatometer, Waldenburg's.....			Shell Handles:
		Pocket Cases:	1415	86	Bistoury and Scalpel.....
	67	Andrews'.....	1416	86	Bistoury and Tenotome.....
		Bingham's, Aseptic.....	1414	86	Gum Lancet and Tenaculum.....
		Briggs', Aseptic.....	1417	86	Post's and Buck's Needles.....
	69	Brown's.....			Any other combination, same price.
	69	Crosby's.....			Pocket Instruments, Double, Spring Catch,
	72	Dugas'.....			Shell Handles:
	72	Dugas' (Dressing Case).....	1418	87	Gum Lancet and Tenaculum.....
	69	Exhibition.....	1420	87	Syme's Abscess Knife and Tenaculum.....
	66	Four-fold.....			Any other combination, same price.
	69	Gay's.....	1421	87	Pocket Instruments, Four Bladed, Spring
	68	Gross'.....			Catch.....
	68	Gross', Fine.....			Any other combination, same price.
	88	Gunn's.....	1422	87	Pocket Instruments, Single, Plain Shell
	68	Hamilton's.....			Handle.....
	73	Hayward's, Aseptic.....			Any style of blade, same price.
	72	Helmuth's.....			Pocket Instruments, Single, Slide Catch,
4017					Shell Handles:
TO	625	Heuel's.....	1413	86	Cooper's Hernia Knife.....
4037			1411	86	Curved Probe-pointed Bistoury.....
	66	Hospital.....	1409	86	Curved Sharp-pointed Bistoury.....
		Keyes'.....	1412	86	Gum Lancet.....
		Lilliputian, Aseptic.....	1408	86	Scalpel.....
	67	Little's.....	1410	86	Tenaculum.....
	71	Minor's.....	1407	86	Tenotome.....
	68	Multum in Parvo.....			Any other style of blade, same price.
	73	Park's Aseptic.....			Pocket Instruments, Single, Spring Catch,
	67	Parker's.....			Shell Handle, any style of blade.....
	67	Parker's, Fine.....	1221	35	Pole Changer.....
		Parkinson's Aseptic.....	2021	186	Politzer's Acoumeter.....
		Porter's Aseptic.....	2139	201	Air Bag.....
	72	Regimental.....	2052	191	Cotton Wool Forceps.....
	66	Sayre's.....	2045	191	Ear Spoon, Hard Rubber.....
4038			2101	196	Eyelet, each.....
4039	628	Smith's Compact, Aseptic.....	2101	196	Eyelet Forceps.....
		Smith's Large, Aseptic.....	2016	185	Manometer.....
		Smith's Medium, Aseptic.....	2128	197	Mastoid Knife.....
	66	Three-fold.....	2129	197	Mastoid Scoop.....
1274	70	Tiemann's Patent, "A".....	2099	196	Myringotome, Angular.....
1276	71	Tiemann's Patent, "B," Aseptic.....	2105	196	Myringotome, Straight.....
		Tiemann's Patent, "B," Aseptic, Small.....	2059	192	Polypus Forceps.....
	66	Two-fold.....		202	Set of Ear Instruments.....
	66	Two-fold.....	2022	186	Tuning Fork.....
		U. S. Army, Aseptic.....	2099	196	Tympanum Perforator, Angular.....
	67	Van Buren's.....	2105	196	Tympanum Perforator, Straight.....
		Walker's, Aseptic.....			Polk's Needle, for Extirpation of Uterus.....
	67	Weir's.....	3650	512	Polypotome, Aveling's.....
	69	Wight's.....			Polypus, see Aural: Foreign Body and Poly-
		Wight's Latest.....			pus, Nasal Polypus, Uterine Tumors and
	68	Wood's.....			Polypi.
	71	Woodworth's.....	1290	76	Polypus Dressing Forceps.....
	73	Wright's, No. 1.....			Ecraseur, see Ecraseur.
	73	Wright's, No. 2, Aseptic.....			Snare, see Wire Snares.
1830	150	Pocket Gouge and Spatula.....	2204	213	Syringe, Upson's.....
2446	261	Illuminator.....	2055	192	Pomeroy's Ear Forceps.....
		Pocket Instruments:	2082	194	Ear Syringe.....
		Abscess Lancet.....	2133	199	Eustachian Catheter Holder.....
1419	87	Seton Needle.....	2444	260	Reflector and Holder.....
1423	87	Spud and Needle.....			Poore's Osteoclast.....
1839	150		1643	113	Osteotomes, each.....
			1536	98	Pope's Antrum Drill.....

FIG.	PAGE.		PRICE.
2093	195	Port Acid Glass, Buck's	\$0.10
		Caustique, see Caustic Holder.	
1304	77	Caustique and Eye Curette	2.50
		Cordon	2.50
1127	18	Portal Vein Ligator	1.75
1292	76	Porte Mèche	.40
2726	310	Porte Mèche and Tampon	.75
2577	283	Porter's Croup Kettle	4.50
3434	484	Uterine Repositor	6.00
		Post's Brush Electrode	2.50
1611	106	Chain Saw and Ligature Carrier	4.00
1171	32	Electro-Massage Roller	8.00
	57	General Operating Set	150.95
1417	86	Needle, with Buck's, in One Handle	2.50
2317	231	Pin Conductor	1.00
1326	80	Pin Conductor	1.00
2123	197	Rongeur	3.00
1620	108	Rongeur	3.00
1392	84	Tissue Separator	1.50
4187	700	Torticollis Brace	12.00
1174	32	Warm Water Electrode	2.75
2184	210	Posterior Nares Syringe, Bennett's	10.00
2182	210	Hard Rubber	1.25
2418	249	Lefferts'	3.00
2185	210	Yearsley's	2.50
	207	Posterior Rhinoscopy.	
		See also Rhinoscope and Nasal Speculum.	
678		Posterior Spinal Curvature.	
15		Post Mortem and Dissecting.	
1100	14	Anatomical Syringe	35.00
	17	Post Mortem Examination Sets:	
	17	Hutchison's Set, No. 2	24.00
	17	Finnel's Set	12.50
	17	Set No. 1	28.00
	17	Set No. 3	22.00
		Post Mortem Instruments:	
1106	15	Blow-pipe	.25
1110	15	Brain Knife	1.50
1125	16	Calvarian Clamp, Satterthwaite's	5.50
1120	16	Calvarian Hook	1.50
1126	16	Chain Hook	.25
1119	16	Chisel	.75
1117	16	Costotome Chisel	1.50
1108	15	Coxeter's Dissecting Forceps	.50
1114	16	Darling's Chain Hooks	.50
1101	15	Darling's Dissecting Scalpel	.75
1102	15	Dissecting Forceps	.50
1104	15	Dissecting Hook	.50
1121	16	Dissecting Hook, Double	.50
		Dissecting Scalpel	.60
1122	16	Double Rachitome	15.00
1107	15	Enterotome	2.50
1109	15	Finnel's Knife and Saw	4.50
1123	16	Grappling Hook	.60
1116	16	Hammer	2.50
		Needle	.15
		Needle, Bayonet	.25
1115	16	Rachitome, Chisel	2.00
1122	16	Rachitome, Double Saw	15.00
1118	16	Rachitome, Satterthwaite's	5.00
1111	15	Reamer	1.00
1113	15	Saw, Knife and Handle	5.50
1105	15	Scissors, Dissecting	.75
1103	15	Steel Handle Cartilage Knife	.60
1124	16	Tripod, Head Rest	3.00
1112	15	Warren's Demonstrating Knife	1.25
2415	248	Post-Nasal Curette, Lefferts'	2.50
2414	248	Forceps	4.50
2416	248	Forceps, Curtis'	4.50
	678	Pott's Disease.	
		See Spinal Braces.	
3955	600	Pott's Splint (Raphael's)	5.00
		Powder Blower, see Insufflator.	
2187	211	Powder Blowing Tubes for Post-Nares, ea.,	.25

FIG.	PAGE.		PRICE.
2948	359	Powell's Dilator	\$35.00
	64	Operating Case	85.00
	335	Prepuce Instruments, see Phimosis.	
1882	157	Prince's Advancement Forceps	2.00
4306	752	Artificial Hand	60.00
1551	100	Bone Staff	3.50
1883	157	Canthoplasty Needle	2.50
4338	758	Canthoplasty Needle, with Spool	4.50
4336	758	Cocaine Pipette	.75
4337	758	Eye-lid Hook	2.25
2313	231	Harelip Clamp	3.00
1993	178	Lachrymal Syringe	1.00
1992	178	Medicating and Drainage Canula, ea.	.75
1886	159	Pterygium Divulsion Hook	1.50
2666	304	Rectal Obturator, without Syringe	3.50
1613	106	Retractor and Chain Saw Carrier	3.50
4338	758	Spool Eye Needle	4.50
1551	100	Staff	3.50
2348	235	Staphylorrhaphy Needle	10.00
1442	91	Tenaculum Forceps	6.00
2352	235	Tenaculum Needle	10.00
3111	415	Pritchard's Anklets and Wristlets	8.00
2957	361	Pritchett's Rotating Urethrotome	25.00
2613	292	Probang, Bristle	1.50
2612	292	Silver Bucket	3.50
		Sponge	.25
2614	292	Stanford's	2.50
3001	376	Probe, Arnott's, Grooved	1.50
1349	82	Bullet, Burr-Head Seeker	1.00
1351	82	Bullet, Eldridge's	.75
4372	764	Bullet, Fluhrer's Aluminium	4.50
1353	82	Bullet, Hamilton's Set	2.50
1354	82	Bullet, Long, Silver	.75
1350	82	Bullet, Nelaton's	.60
1352	82	Bullet, Sayre's Vertebreated	8.00
1355	82	Bullet, Tiemann's	.75
1342	81	Director and Tongue-Tie	1.00
2013	185	Ear, Angular, Steel	.75
2014	185	Ear, Buck's, Silver	.60
2014b	185	Ear, Buck's, Silver	.75
		Lachrymal, see Ophthalmic; Lachry-	
		mal Probes.	
2695	307	Rectal, Silver	1.25
2696	307	Rectal, Silver	1.25
1343	81	Silver, per pair	.75
		Uterine, see Uterine Probes.	
1370	84	Probe-pointed Bistoury	1.25
1383	84	Bistoury, Little's	1.50
1086	13	Bistoury, Microscopic	1.25
1398	85	Bistoury, Plain	1.00
1135	18	Scissors	1.25
2681	306	Proctotomy Knife, Kelsey's	1.75
	705	Progressive Locomotor Ataxia.	
2749	312	Prolapsus Ani Supporter	8.00
2750	312	Ani Supporter, Matthieu's	5.00
		See also Pile Bougies.	
		Prolapsus Uteri Supporter, see Abdominal	
		Supporter, also Pessaries.	
		Prostate, Tunnelling the:	
3012	381	Fitch's Dome Trocar Catheter	6.00
	378	Prostatic.	
	427	Calculi.	
		Catheters, see Catheter, Prostatic.	
3009	380	Dilator, Gouley's	16.00
3011	381	Dilator, Harrison's, each	1.50
3008	380	Dilator, Mercier's	10.00
3010	381	Dilator, Walker's	35.00
3160	427	Dilator, Walker's Divulsor	2.00
3032	386	Guide, Keyes'	.75
3033	386	Guide, Otis'	1.00
3002	378	Sound, Mercier's	1.50
	379	Prostatotomy and Prostatectomy:	
3012	381	Fitch's Dome Trocar Catheter	6.00
3007	379	Gouley's Prostatectome	10.00

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Prostatotomy and Prostatectomy:		1118	16	Rachitome, Satterthwaite's	\$5.00
3004	379	Mercier's First Excisor	\$40.00	3935	591	Radius Splint, Left	.50 to .80
3006	379	Mercier's Last Excisor	50.00	3934	591	Right	.50 to .80
3005	379	Mercier's Last Incisor and Ecraseur combined	60.00	2569	282	Ramage's Inhaler	1.25
		See also Prostatic Dilator.		3955	600	Raphael's-Pott's Splint	5.00
747		Prosthetic, see Artificial Arm, Artificial Hand, Artificial Humerus, Artificial Leg, Dangle Limbs, Pseudarthrosis.		1007	8	Rapid Filtration Apparatus	5.00
4305	752	Short Leg, Bigg's Apparatus for	35.00	1535	98	Raspatory	1.75
1768	145	Prout's Entropium Forceps	4.00	1547	98	and Trepanning Elevator	1.25
1810	148	Lachrymal Knife	2.50	1585	102	and Trepanning Scalpel	1.50
2104	196	Myringotome	1.00	1542	98	U. S. Army	2.50
1340	81	Needle Forceps	3.50	2779	328	Ratchet Truss	4.50
1783	146	Needle Forceps	3.50	1772	146	Ratti's Trichiasis Forceps	3.00
1429	88	Prussian Field Tourniquet	.75	2475	265	Rauchfuss' Powder Blower	2.00
		747 Pseudarthrosis:		1		Re-agents, Urine Test, Prices on Page 1.	
4296	748	Apparatus for False Joints in Leg or Thigh, for Adults	40.00 to 75.00	1111	15	Reamer, Post Mortem	1.00
4296	748	Apparatus for False Joints in Leg or Thigh, for Children	25.00 to 35.00	1975	174	Reclination Needle, Walton's	1.25
4301	750	Artificial Humerus	35.00 to 70.00	303		Rectal Alimentation.	
4297	749	Smith's Brace, for the Femur, 50.00 to 75.00		2694	307	Applicator, Kelsey's	.75
4299	749	Smith's Brace, for the Forearm, 35.00 to 60.00				Bistoury, see Rectal Stricture: Fis- tula and Fissure.	
4300	750	Smith's Brace, for the Humerus, 35.00 to 70.00		2655	301	Bougie, English, Conical	1.25
4298	749	Smith's Brace, for the Tibia . 30.00 to 40.00		2654	301	Bougie, English, Cylindrical	1.00
2925	352	Psychrophor, Winternitz's, Silver	4.00			Bougie, French	.75
2925	352	Winternitz's, Soft Rubber	2.50	2657	301	Bougie, Kelsey's	1.50
1886	159	Pterygium Divulsion Hook, Prince's	1.50	2661	302	Bougie, Wales', for Prices see Wales'	
1884	159	Scissors, Chadwick's	6.00			Rectal Bougie.	
3981	610	Pulleys, Dislocation, Brass, per pair	7.00	2697	307	Brush Holder	2.50
		Dislocation, Japanned, per pair	5.00	2743	312	Cauteries, each	1.50
3786	548	Pulling's Funis Clamp	.40			See also Hemorrhoidal Cautery Irons.	
		11 Pulsometric:		2692	307	Curette	2.00
1070	11	Dudgeon's Sphygmograph	25.00			Rectal Dilators:	
1072	11	Marey's Sphygmograph	75.00	2647	300	Anal Dilator	10.00
1071	11	White's Hæmarumscope	2.50	2646	300	Rectal Dilator	10.00
2585	285	Pump, Air, Novelty		2650	300	Sims' Anal Dilator	4.50
2584	285	Air, Sass'		2652	300	Thebeaud's Sphincter Ani Dilator	12.00
		Aspirator, see Aspirator.		2658	302	Whitehead's Instrument for Dilata- tion	3.00
		Cupping, see Cupping Pump.				See also Rectal Bougie and Rectal Specula.	
		Enema, see Rectal Infusors (Injec- tors), &c.		2689	306	Rectal Director, Flexible Silver	1.50
		Stomach, see Stomach Pump.		307		Dressing.	
1757	144	Pupillometer	5.00			See also Rectal Applicator, Rectal Brush Holder, Rectal Curette, Rectal Exploring Trocar, Rec- tal Forceps, Rectal Insufflator, Rectal Porte Caustique, Rectal Probe, Rectal Scoop, Rectal Sponge Mop Holder, Rectal Suppository, Rectal Syringe.	
		Pus Basin, Agate, Large	3.00	2739	311	Rectal Ecraseur, Smith's Wire	6.00
		Agate, Medium	2.50			Rectal Electrodes:	
		Agate, Small	2.00	1183	33	Ball	1.25
2087	195	Brass, Large	3.00	1230	36	Insulated	2.50
2087	195	Brass, Medium	2.50	1185	33	Insulated with Hard Rubber	2.00
2087	195	Brass, Small	2.00	1188	33	Large, Nickel Plated	1.40
2088	195	Hard Rubber, Large	3.00	1184	33	Nickel Plated	1.25
2088	195	Hard Rubber, Medium	2.50	2656	301	Rectal Exploring Sound, Bodenhamer's, ea.	1.00
2088	195	Hard Rubber, Small	2.00	2703	307	Exploring Trocar	1.50
2089	195	Triangular, Hard Rubber	3.00	2665	303	Feeding Tube, Tiemann's	1.50
1281	75	Triangular, Hard Rubber	3.00	2693	307	Forceps	2.00
1280	75	Warren's, Soft Rubber	3.50			Rectal Infusors, Injectors and Irrigators:	
				2673	305	Bodenhamer's Irrigator	3.00
1062	9	Quain's Stethometer	10.00	2670	305	Clendinen's Irrigator	6.00
1034	5	Stethoscope	2.00			Davidson's Syringe, No. 1	2.00
3194	437	Quatrivalve Speculum Vaginæ, Meadow's.	15.00			Davidson's Syringe, No. 2	1.50
3192	437	Speculum Vaginæ, Tiemann's	10.00	2667	305	Maw's Enema Pump	4.50
3846	562	Quill Suture Stay, Munson's, per pair	.75	2672	305	Munde's Irrigator	1.50
2051	191	Quire's Nasal and Ear Curette	2.25	2671	305	Parker's Syringe	3.00
				2666	304	Prince's Obturator, without Syringe.	3.50
713		Rachitic Deformities.		2668	305	Syphon Syringe	2.50
		See also Orthopædic: Paralytic, Spastic and Rachitic Deformities.		2665	303	Tiemann's Rectal Feeding Tube	1.50
1115	16	Rachitome, Chisel	2.00	2704	307	Rectal Insufflator	2.50
1122	16	Double Saw	15.00			Pile, see Hemorrhoidal.	

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
2736	311	Rectal Polypus Forceps, Luer's	\$6.00	2748	312	Reed's Pile Bougie	\$1.25
2699	307	Porte Caustique	3.00			Rectum Speculum	3.50
2726	310	Porte Mèche and Tampon	.75	1661	117	Reese's Uterine Leech	4.50
2688	306	Probe, Elastic	.50	3620	506	Uterine Leech	4.50
2695	307	Probe, Silver	1.25	4253	734	Reeve's Scarpa Shoe, each	12.00
2696	307	Probe, Silver	1.25	4251	734	Universal Talipes Shoe, each	8.00
2680	306	Scarificator	1.50	4252			
2691	307	Scoop, Kelsey's	2.50	3419	482	Reflux Catheter, Byrne's	2.50
2741	311	Scoop, Siemon's Sharp	2.50			See also Catheter, Double Current.	
Rectal Specula:				72	Regimental Surgeons' Pocket Set.		
2636	298	Ashton's Fenestrated	1.00		Reginald Harrison, see Harrison.		
2642	299	Bivalve	5.00	3240	446	Reid's Speculum Vaginae	6.00
2649	300	Bivalve, Small	4.50	1332	80	Reiner's Needle Forceps	4.00
2651	300	Bodenhamer's Recto-Colonic Endo- scope	7.50	3645	511	Reinstetter's Rinse Curette	4.00
2634	298	Bodenhamer's Reflector and Lens	20.00	3420	482	Reliquet's Double Current Catheter	3.50
2635	298	Ferguson's Tubular, Glass	.50	3056	398	Urethral Stone Crusher	15.00
2635	298	Ferguson's Tubular, Hard Rubber	1.00			Repositors, see Uterine Repositors.	
2635	298	Ferguson's Tubular, Hard Rubber and Metal	1.50	616	Resection.		
2635	298	Ferguson's Tubular, Metal	1.50		See Exsection, also Osteotomy: Resec- tion and Exsection.		
2640	299	Gorget-formed	2.00	1045	7	Resonator, Holden's	2.50
2639	299	Helmuth's	3.50		Respirators:		
2638	299	Kelsey's	6.00	2570	282	Dobell's Residual Air Pump	3.00
4346	759	Kelsey's Retractor	3.50	2574	283	Gedding's	5.00
2645	299	O'Neal's	6.50	2568	282	Jeffrey's Mouth	2.50
2644	299	O'Reily's	4.50			Jeffrey's Mouth and Nose	3.00
		Reed's	3.50	2572	282	Nitz's	1.50
4398	769	Shufford's		2566	282	Richardson's Instrument to Re-es- tablish Respiration in Asphyxia	4.50
2648	300	Sims'	5.50	2571	282	Tyndale's Antiseptic Oro-Nasal Res- pirator	3.50
2632	298	Tiemann's Trivalve	12.00	280	Respiratory Apparatus.		
2633	298	Trivalve Trellis	16.00		See also Inhaler.		
2637	299	Van Buren's	3.50	761	Respiratory Passages:		
2641	299	Van Buren's Depressor	2.50		Carbon-dioxide Generator and Reser- voir		
4348	759	Walker's, Set of 3, with 1 Handle	15.00	4357	761	Restraints for the Insane:	6.00
2643	299	William's	4.50	4358			
		William's, Fenestrated	5.00	631	Anklets, with Large Buckle			6.00
2702	307	Rectal Sponge Mop Holder	.75	4050	631	Anklets, with Small Buckle	6.00
306	Rectal Stricture, Fissure and Fistula:			4051	631	Buckle	2.50
2690	306	Allingham's Scissors and Director for Fistula en Ano	7.00	4045	631	Buckle, alone	2.00
2677	306	Bistoury, Blunt Pointed, Small	1.75	4045	631	Buckle, with Strap	2.50
2682	306	Bistoury Caché, for Fistula	7.00	4054	632	Lynch's Lock Buckle, alone	2.00
2679	306	Bistoury Caché, for Stricture	7.00	4054	632	Lynch's Lock Buckle and Strap	2.50
2687	306	Bistoury, Cooper's	1.25	4046	631	Lynch's Muff	8.00
2685	306	Bistoury, Curved, Probe-pointed	1.25	4047	631	Mitts	8.00
2686	306	Bistoury, Curved, Sharp Point	1.25	4053	631	Shoe Buckle, with Strap and Loop	1.00
2684	306	Bistoury, Straight, Round Point	1.25	4049	631	Straight Jacket, Long	10.00
2683	306	Bistoury, Straight, Sharp Point	1.25	4049	631	Straight Jacket, Short	8.00
2675	306	Bodenhamer's Anal Fissure Knife	5.00	4048	631	Wristlets	5.50
2674	306	Bodenhamer's-Blandin's Knife	8.00	2895	348	Retention Catheter, Gouley's	2.50
2678	306	Kelsey's Knife, Fistula	2.50	2899	349	Catheter, Otis'	3.00
2681	306	Kelsey's Proctotomy Knife	1.75			Catheter, Teevan's	2.50
2701	307	Rectal Suppository, Hard Rubber	1.50	2897	348	Catheter, Thompson's	3.00
2698	307	Rectal Syringe, Hutchison's, with 1 Hard Rubber Tube	3.00	2900	349	Catheter, Bumstead's-Thompson's	3.50
2698	307	Hutchison's, with 3 Silver Tubes	10.00	384	See Catheters.		
2711	308	Rectal Tenaculum, Byrne's Double	6.00	1011a	3	Retort Stand	1.50
Rectal Trocars, for Rectal Puncture of the Bladder:				1558	100	Retractor, Bilroth's, Three-Pronged	3.00
1730	128	Buck's Trocar	3.50	1559	100	Bilroth's, Two-Pronged	3.00
3049	392	Cock's Instrument	15.00	1553	100	Blackman's	1.50
1729	128	Parker's Guarded Trocar	4.50	1552	100	Blandin's (Bone Staff)	3.00
1728	128	Trocar	2.50			Cheek, see Cheek Retractor.	
1731	128	Van Buren's Double Tube, Silver	4.00	1854	151	Desmarre's, Eyelid	1.75
2738	311	Rectal Tumor Forceps, Kelsey's	2.50	1855	151	Desmarre's, Eyelid	1.75
3122	417	Rectangular Staff, Buchanan's	2.50	1555	100	Durham's	3.00
3708	529	Rectilinear Ecraseur, Nott's	12.00			Emmet's, Perineal	7.00
Recto-Colonic:				1556	100	Lange's	3.00
2651	300	Endoscope, Bodenhamer's	7.50	1560	100	Langenbeck's, Blunt	2.50
2669	305	Enema Apparatus	16.00	1561	100	Langenbeck's, Sharp	2.50
2653	301	Exploring Sound	8.00	4375	765	Large Blunt Hook	3.00
2767	317	Redfern-Davis' Hernia Instrument	15.00	1376	84	Little's	1.50
Redressors, see Uterine Repositors.				2364	236	Luer's, Cheek	2.00
				2555	279	Miner's, Trachea	4.50

FIG. PAGE.	PRICE.	FIG. PAGE.	PRICE.		
1554 100	Retractor, Mott's, per pair.....	\$1.50	3774 541	Robertson's Obstetrical Forceps.....	\$8.00
1849 151	Noyes', Eyelid.....	1.75	2210 216	Robinson's Evulsion Forceps.....	4.50
1550 100	Parker's, per pair.....	1.50	3794 548	Insufflator, Asphyxia.....	1.50
2537 277	Pilcher's, Supra-Sternal.....	2.50	3737 536	Obstetrical Forceps.....	8.00
2540 277	Pilcher's, Tracheotomy.....	2.00	2188 211	Powder Blower.....	3.00
1551 100	Prince's (Bone Staff).....	3.50	3770 541	Rockwell's Obstetrical Forceps.....	8.00
1613 106	Prince's, and Chain Saw Carrier.....	3.50	2578 283	Roe's Inhaler.....	2.00
4388 766	Riesenhaken (Giant Hook).....	5.00	2366 236	Mouth Gag and Cheek Retractor.....	2.50
1557 100	Roberts'.....	1.50	2607 291	Esophageal Dilators, each.....	1.00
4233 724	Roberts' Protecting.....	.....	2608 291	Esophagotome.....	15.00
2534 277	Rose's, Tracheotomy.....	1.00	2451 263	Tobold's Laryngoscope.....	45.00
3335 461	Simon's, Plain.....	3.00	2452 263	Uvula Hook.....	1.00
3334 461	Simon's, Serrated.....	3.50	1762 145	Roehrich's Entropium Forceps.....	3.00
4376 765	Small Blunt Hook.....	3.00	2990 372	Rogers' Dilating Urethrotome and Urethrometer.....	40.00
1563 100	Tenaculum, Double.....	2.50	2831 336	Phimosis Forceps.....	3.00
1562 100	Tenaculum, Single.....	2.00	1277 74	Roller Bandage. Send for Price List.	.....
1564 100	Tenaculum, Triple.....	2.50	3765 540	Roller's Obstetrical Forceps.....	8.00
4385 766	Volkmann's.....	3.00	Rongeurs (Gouging Forceps):		.....
2532 277	Well's, Tracheotomy.....	2.00	1599 103	Curved Rongeur.....	3.50
4413 770	Reverdin's Needle, Fixed or Folding Handle,	6.00	1597 103	Darby's Rongeur and Bone Holder.....	4.00
1245 40	Revulsor, Hamilton's.....	8.00	1590 103	Hoffmann's Gouge Forceps.....	4.00
Reynold's Vaginal Douche.....		2.50	1620 108	Post's Rongeur.....	3.00
2229 220	Rhinometer, Jarvis'.....	9.00	2123 197	Post's Rongeur.....	3.00
2215 217	Rhinoplastos, Adams'.....	3.00	1598 103	Straight Rongeur.....	3.50
2217 217	Bosworth's.....	3.50	2140 201	Roosa's Politzer's Bag.....	3.50
Gleitmann's.....		12.00	202	Set of Ear Instruments.....	43.40
2216 217	Weir's.....	3.00	Root Extractor, see Dental, Root Extractor.		.....
208 Rhinoplasty.....		.....	Root Forceps, see Dental, Forceps.		.....
2170 208	Rhinoscope, Duplay's.....	8.00	2534 277	Rose's Trachea Retractor.....	1.00
2171 208	Fränkel's.....	8.00	2826 335	Ross' Circumcision Ring.....	1.00
2172 208	Simrock's.....	8.00	2209 215	Rotating Scissors, Smith's Canulated.....	5.00
205 Rhinoscopic:		.....	3301 453	Smith's (Heywood).....	12.00
2168 208	Mirror, Jarvis'.....	4.00	2488 287	Tiemann's.....	8.50
2167 207	Mirror, Plain, each.....	1.25	1334 80	Roux's Needle Holder.....	4.50
206 Set, Wagner's.		.....	3446 486	Rozer's Pessary.....	6.00
Speculum, see Nasal Speculums.		.....	74 Rubber Bandage. Prices on page 74.		.....
207 Rhinoscopy, Posterior.		.....	2011 184	Rumbold's Acou-Otoscope.....	2.50
1549 99	Rib Shears, Costotome.....	6.00	2453 263	Laryngeal Mirror.....	10.00
1259 48	Richardson's Atomizer, Hard Rubber.....	3.00	2494 268	Scissors and Forceps for Laryngeal Tumors.....	.....
1259 48	Atomizer, Silver.....	5.50	2455 263	Soft Palate Retractor.....	7.50
3639 511	Finger Elongator.....	6.00	2377 238	Tongue Depressor, with 3 Blades.....	6.00
2566 282	Instrument to Re-establish Respiration in Asphyxia.....	4.50	2454 263	Uvula Retractor.....	2.00
3922 588	Splint (Clavicle, Scapula and Humerus).....	6.00	2466 264	Ruppaner's Brush Holder.....	1.00
4191 701	Richter's Torticollis Brace.....	.....	Ruptured Perineum, see Perineorrhaphy.		.....
Riding Belt, see Abdominal Belt.		.....	2715 309	Perineum Needle.....	1.00
4388 766	Riesenhaken.....	5.00	4369 764	Rushmore's Grooved Catheter.....	1.50
3430 486	Ring Pessary, Elastic.....	.50	1336 80	Russian Needle Holder.....	4.00
Hard Rubber.....		.50	3788 548	Ryerson's Adjustable Vectis.....	7.00
3442 486	Inflatable.....	.50	1483 94 Sabine's Artery Clamp Forceps.....		2.50
3443 486	Inflated.....	.50	Saddle Bags, see Medical Saddle Bags.		.....
3465 489	Metal.....	.50	Sajou's Acetic Acid Applicator.....		10.00
Meyer's.....		.50	Chronic Acid Applicator.....		10.00
Peaslee's.....		.50	Laryngeal Forceps.....		4.00
3471 489	Wilhoff's.....	.50	Nasal Insufflator, for Patient's Use.....		.50
Ripley's Catheter.....		2.00	Nasal Saw.....		2.00
1644 114	Rizzoli's Osteoclast.....	35.00	Nasal Speculum.....		2.50
2156 205	Robert and Colin's Nasal Speculum.....	3.50	Palate Retractor.....		3.50
4132 675	Roberts' Elastic Knee Extension Splint.....	35.00	3675 516	Polypus Snare, Plain.....	4.00
4232 723	Electro-Osteotome.....	.....	3675 516	Polypus Snare, with Curved and Straight Ends.....	5.00
4222 717	Genu Valgum Brace.....	.....	Polypus Snare, with Scissor Handles.....		11.00
4078 650	Hip Splint, Long.....	30.00 to 40.00	Septum Punch.....		20.00
4077 649	Hip Splint, Short.....	22.00	Tonsilotome.....		12.00
4195 703	Jury Mast.....	25.00	3675 516	Wire Eraseur.....	4.00
4100 661	Knee Splint, Plain.....	25.00	78	Salmon-Gut Suture, per package.....	1.50
4097 660	Knee Splint, with Tibial Rotation.....	35.00	3958 601	Salter's Cradle.....	20.00
1713 126	Pericardial Trocar.....	3.50	3345 467	Sampson's Urethral Speculum.....	6.00
4233 724	Protecting Retractors.....	.....	1341 81	Sands' Needle Forceps.....	4.50
1557 100	Retractor.....	1.50	1782 146	Needle Forceps.....	4.50
2223 219	Septum Punching Forceps.....	6.00	2611 291	Esophagotome.....	40.00
4186 699	Spinal Extension Jacket.....	20.00 to 30.00			.....
4194 703	Torticollis Brace.....	25.00			.....
1001 2	Urine Test Apparatus.....	25.00			.....

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
1584	102	Sands' Periosteotome	\$2.50	1375	84	Sayre's Tenotome, Sharp Pointed	\$1.25
2596	287	Sass' Hand-Ball Spray Producer	5.00	4140	632	Tripod	10.00
2584	285	Spray Producer, with Receiver and Air Pump				Scales, see Guages.	
2588	286	Spray Tube and Bottle				Scalpel, Amputating, see Amputating Knives.	
2380	238	Tongue Depressor	3.50	1512			
1593	103	Satterlee's Bone Forceps, Large	3.00	1516	96	Aseptic, each	1.50
1593	103	Bone Forceps, Small	2.50	3123	417	Depuytren's	1.75
1527	97	Capital Saw	5.00	1366	84	Feruled, Four Sizes, each	1.25
		Saw, Amputating, see Amputating Saw.		2315	231	Harelip	.75
		Metacarpal, see Metacarpal Saw.		1777	146	Lid, Large	1.50
		Nasal, see Nasal Saw.		1779	146	Lid, Medium	1.50
		Resection and Exsection, see Osteotomy: Resection and Exsection		1778	146	Lid, Small	1.50
		Saws.				Lithotomy, see Lithotomy Scalpel.	
3760	539	Sawyer's Obstetrical Forceps	7.00	1381	84	Little's, Large	1.50
3744	537	Obstetrical Forceps, Long	10.00	1380	84	Little's, Medium	1.50
3741	537	Obstetrical Forceps, Short	8.00	1379	84	Little's, Small	1.50
4108	665	Sayre's Ankle Compressor, Rubber	6.00			Microscopic, see Microscopic Scalpel.	
4109	666	Ankle Joint Splint	22.00	3690	523	Pilcher's Aseptic	1.50
4276	742	Apparatus for Flat Foot, each	12.00	1400		Plain, Ebony Handle	.75
3884	575	Bandage Shears	7.00	1401	85	Ivory Handle	1.00
1352	82	Bullet Probe	8.00	1402			
3923	588	Clavicle Dressing.				Pocket, Plain	1.00
4246				1408	86	Pocket, Slide Catch	1.75
4247	732	Clubfoot or Talipes Shoe, ea. 10.00 to 14.00				Pocket, Spring Catch	2.00
4248						Tracheotomy, see Tracheotomy Scalpel.	
4249	733	Clubfoot or Talipes Shoe, improved, each 10.00 to 14.00		1538	98	Trepanning	1.50
4080	651	Cuirass, Large	45.00	1651	115	Scarificator, 10 Bladed	4.50
4080	651	Cuirass, Medium	35.00	1652	115	12 Bladed	4.50 to 8.00
4080	651	Cuirass, Small	25.00	1780	146	Desmarre's Eyelid	1.50
4092	658	Double Extension, Knee-Joint	20.00	2680	306	Rectal	1.50
4087	656	Double Extension, Knee-Joint.		1650	115	Tiemann's Patent	7.00
3913	583	Extension Sundries	4.00			Scarifier, see Uterine Scarificator.	
4062	642	Hip Splint, Long	25.00 to 45.00	1679	120	Scarifying Spud, Piffard's	1.25
4063	642	Hip Splint, Long, with Socket Attachment on Shoe 30.00 to 50.00		1909	163	Scarpa's Iris Needle	1.25
4058	639	Hip Splint, Short, Improved. 17.00 to 20.00		2615	292	Schaffer's Throat and Uterine Scoop	8.00
4056	638	Hip Splint, Short, Original 15.00 to 18.00		3726	531	Schapp's Spiral Drainage Tube	1.50 to 3.50
4174	696	Jacket for Lateral Curvature.		3193	437	Schlotterbeck's Speculum Vaginæ	7.00
	695	Knitted Seamless Shirt 2.00 to 4.00		3789	548	Scholler's Cord Carrier	4.00
		Lacing and Trimming 6.00 to 12.00		2515	272	Schröetter's Laryngeal Catheter	3.00
4142	684	Jury Mast	12.00	1235	38	Laryngeal Cautery Electrodes Complete	16.00
4086	655	Knee-Joint Splint	20.00			No. 1, Snare	3.50
4127	671	Knee Support, for After Treatment in Joint Disease 30.00 to 40.00				No. 2, Lancet	3.00
4242	731	Method of Attaching Barwell's Muscles:				No. 3, Porcelain Burner	3.50
		Hooks, each	.10			No. 4, Knife	3.00
		India Rubber, per foot	.12	2484	267	No. 5, Voltolini's Knife	3.25
		Moleskin Plaster, per yard	1.50	2438	238	No. 6, Blunt Cautery	3.00
		Tin Plate, with Loop, each	.20			Laryngeal Lancet and Forceps	15.00
		Wire Eyes, each	.10	2515	272	Laryngoscope	6.50 to 8.00
1583	102	Periosteotome	2.00			Stenosis Tube	3.00
2333	233	Periosteotome	2.00			Schultz's Pelvimeter	8.00
4174	696	Plaster Jacket.		2785	324	Schuppert's Galvanic Truss	15.00 to 20.00
4140	682	Plaster of Paris Jacket.		3232	445	Schuyler's Combination Speculum	12.00
4143	685	Plaster of Paris Jacket and Jury Mast.		3773	541	Obstetrical Forceps	11.00
	66	Pocket Set	23.50	2118			
4278	743	Rotator	25.00 to 35.00	2118	197	Schwartz's Chisels, each	1.25
4108	665	Rubber Compressor, Ankle	6.00	2114			
4085	654	Rubber Compressor, Knee-Joint	6.00	2114	197	Gouges, each	1.25
	695	Seamless Shirt	2.00 to 4.00	2117			
4172	694	Self Suspension.		1847	151	Schwatka's Eye Speculum	2.50
4173				2949	339	Schweig's Urethral Stricture Dilator	10.00
3884	575	Shears, Plaster Bandage	7.00	2690	306	Scissors, Allingham's, Fistula in Ano	7.00
		Spiral Spring Corset	20.00 to 25.00	1925	164	Althof's, Iridectomy	5.00
4141	683	Suspension Apparatus, Japanned	8.00	3680	516	Amputating, Cervix Uteri	6.00
4140	682	Suspension Apparatus, Nickel Plated, 12.00		1404	85	Angular, Operating	1.50
4270	740	Talipes Equinus Shoe, each 10.00 to 15.00		2708	308	Angular, Pile	1.50
4249	733	Talipes Shoe, each 10.00 to 14.00		1403	85	Artery	1.75
1374	84	Tenotome, Blunt Pointed	1.25	3611	505	Bozeman's, Angular	4.50
1372	84	Tenotome, Concave Edged	1.25	3286	452	Bozeman's, Curved	4.50
1373	84	Tenotome, Convex Edged	1.25	3285	452	Bozeman's, Double Curved	4.50
				2709	308	Bush's, Pile	1.50
				1884	159	Chadwick's, Pterygium	6.00

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
3679	516	Scissors, Clark's Tooth-edged.....	\$9.00		
1405	85	Curved-on-flat.....	1.50		
		Dissecting, Curved.....	1.00		
1105	15	Dissecting, Straight.....	.75		
1289	76	Dressing.....	1.25		
3299	453	Emmet's, Double Curve.....	4.50		
3297	453	Emmet's, Knee Bent.....	4.50		
3298	453	Emmet's, Slightly Curved.....	4.50		
1107	15	Enterotome.....	2.50		
1986	175	Enucleation.....	1.50		
1291	76	Gay's Open Ring.....	1.50		
2097	196	Gruber's, Ear.....	4.50		
2708	308	Hæmorrhoidal, Angular.....	1.50		
2709	308	Hæmorrhoidal, Bush's.....	1.50		
1932	164	Hall's, Iris.....	6.00		
4410	770	Hanks' Uterine.....	5.00		
2321	231	Harelip, Angular.....	1.50		
2320	231	Harelip, Hamilton's.....	1.50		
3301	453	Heywood Smith's.....	12.00		
2496	268	Heywood Smith's.....	12.00		
		Iridectomy, see Ophthalmic: Cata-			
		ract· Iris Scissors.....			
		Jenks' Uterine.....	4.50		
3678	516	Kuechenmeister's.....	6.00		
		Laryngeal, see Laryngeal Scissors.			
1924	164	Mannoir's, Eye.....	1.50		
3301	453	Movable Points, Smith's.....	12.00		
2488	267	Movable Points, Tiemann's.....	8.50		
		Nasal, see Nasal Scissors.			
1295	76	Old's, and Dressing Forceps.....	3.50		
1406	85	Operating, Straight.....	1.00		
		Operating, Straight, Larger.....	1.25		
		Perforating, see Obstetrical Perfora-			
		tors.			
		Phimosis, see Phimosis Scissors.			
		Pile, see Pile Scissors.			
		Plaster Paris, see Bandage Shears.			
1135	18	Probe-pointed.....	1.25		
3281	452	Sims', Curved, Sharp Points.....	4.50		
3295	453	Sims', Curved.....	4.50		
3296	453	Sims', Straight.....	3.50		
3826	556	Skene's Hawk-bill.....	10.00		
2098	196	Simrock's, Ear.....	4.50		
1677	120	Skin-Grafting.....	10.00		
3301	453	Smith's.....	12.00		
2328	232	Staphyloraphy.....	4.50		
		Steven's, Eye.....	4.50		
		Strabismus, see Ophthalmic: Strabo-			
		tony.			
2536	277	Tardieu's Trachea.....	5.00		
2839	337	Taylor's.....	5.00		
2488	267	Tiemann's, Movable Points.....	8.50		
2393	243	Tonsil.....	4.50		
3679	516	Tooth-edged, Clark's.....	9.00		
2536	277	Trachea, Tardieu's.....	5.00		
		Uterine, see Uterine Scissors.			
2408	246	Uvula.....	5.50		
2409	246	Uvula, with Claws.....	5.50		
1918	163	Wilde's, Canulated (Scissors alone) ..	12.00		
3278	451	Wire Cutting, Sims'.....	3.50		
	693	Scoliosis.			
		Scoliosis Apparatus:			
4170		Barwell's Scoliosis Brace.....	12.00 to 15.00		
4171	694	Barwell's Sloping Seat.....	10.00 to 15.00		
4169	694	Roberts' Spinal Extension Jacket,			
4186	699	20.00 to 30.00			
4174	696	Sayre's Plaster Jacket.....			
4173	695	Sayre's Suspension Apparatus, Ja-			
		panned.....	8.00		
4173	695	Sayre's Suspension Apparatus,			
		Nickel Plated.....	12.00		
4172	694	Sayre's Tripod.....	10.00		
4175	696	Squire's Spineyard.....	7.50		
		Scoliosis Apparatus:			
4184	699	Stillman's Horizontal Frame.....			
4182	699	Stillman's Vertical Extension Brace,			
		30.00 to 40.00			
4183	699	Stillman's Vertical Frame.....			
4180	698	Stillman's V Lever Brace, Combined			
		with Corset.....	50.00 to 60.00		
4176	697	Tiemann's Scoliosis Brace.....	35.00		
4177	697	Tiemann's Scoliosis Brace, Extra Light			
		and Fine.....	40.00		
4185	699	Wolff's Spinal Cradle.....	10.00 to 15.00		
1587	102	Scoop, Bone, Hebra's.....	2.50		
2129	197	Bone, Politzer's.....	2.50		
2502	269	Laryngeal.....	3.00		
2505	269	Laryngeal, Tiemann's.....	6.00		
3136	421	Lithotomy.....	2.50		
3157	426	Lucer's.....	2.50		
		Rectal, see Rectal Scoop.			
2741	311	Siemon's.....	2.50		
3641	511	Siemon's.....	2.50		
3643	511	Thomas', Serrated.....	3.50		
3056	398	Urethral, Reliquet's.....	15.00		
		Uterine, see Uterine Curette.			
		See also Curette.			
3292	452	Scott's Knife.....	1.50		
2302	229	Screw Elevator, Dental.....	1.00		
		Scrotal, see Varicocele.			
		Searcher, see Stone Searcher.			
		Sea-tangle Tent, see Tents.			
		Section-Cutter, see Microscopic.			
		Section-Knives, see Microscopic.			
		Section-Razor, see Microscopic.			
1873	154	Sedillot's Double Hook.....	1.50		
2462	264	Seeger's Brush Holder.....	2.50		
2582	284	Steam Nebulizer.....	12.00		
2448	262	Tobold's Laryngoscope.....	34.00		
		Seeley's Pile Pipe.....	2.00		
3179	431	Segala's Speculum Vaginae.....	8.00		
1017	4	Seguin's Surface Thermometer.....	2.00		
2214	217	Seiler's Septometer.....	4.50		
		Seizing Forceps:			
2398	243	Durham's.....	4.50		
2399	243	Langenbeck's.....	2.50		
2394	243	Mussex's.....	2.50		
3272	449	Self-closing.....	2.50		
2325	232	Self-closing.....	2.50		
3273	449	Sims'.....	3.00		
3267	449	Skene's.....	2.00		
3268	449	Skene's, with Lock.....	3.00		
3269	449	Thomas' Tissue.....	4.50		
2324	232	Whitehead's.....	4.50		
		See also Vulsellum Forceps.			
2777	322	Self-Adjusting Truss.....	3.00 to 5.00		
	694	Self-Suspension in Spinal Curvature:			
1473	695	Pulleys and Head Rest, Japanned ...	8.00		
1473	695	Pulleys and Head Rest, Nickel-plated,			
1472	694	Sayre's Suspension Apparatus, with			
		Tripod.....	18.00 and 22.00		
2814	331	Seminal Cord Compress.....	4.00		
2214	217	Septometer, Seiler's.....	4.50		
1568	101	Sequestrum Forceps, Ferguson's.....	2.50		
1572	101	Hamilton's.....	2.50		
1571	101	Markoe's.....	3.00		
1537	98	Van Buren's.....	2.50		
1476	93	Serrefin, Garrigue's.....	.25		
1477d	93	Langenbeck's.....	.50		
1471	93	Mattock's.....	.50		
1477b	93	Vidal's.....	.25		
1477c	93	Vidal's.....	.25		
1423	87	Seton-Needle.....	1.00		
		Seuter's Bandage Shears.....	5.00		
		Sexton's Cotton Carrier.....	.50		
2068	193	Ear Curette, Double.....	2.00		
2079	194	Ear Douche.....	10.00		

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
2054	191	Sexton's Ear Dressing Forceps, each	\$1.75	3279	451	Sigmoid Catheter, Sims', Hard Rubber	\$1.00
4393	767	Ear Syringe	10.00	3279	451	Sims', Metal	.75
2132	199	Eustachian Catheter	1.25	3279	451	Sims', Silver	1.50
2069	193	Folding Tongue Depressor	2.50			Silk, see Ligature.	
2071	193	Foreign Body Forceps	4.50			Silk Catheter, Conical	1.25
2073	193	Handle and 7 Instruments, in Case	12.00	3027	385	Catheter, Cylindrical	1.00
2142	201	Insufflator	2.00			Catheter, Mercier's	1.25
		Mouth Spatula	.60			Catheter, Olive	1.25
2165	206	Nasal Speculum	1.00			Bougie, Conical	1.25
2145	201	Nozzle for Politzer's Bag	1.00	3028	385	Bougie, Cylindrical	1.00
2092	195	Powder Blower	3.00			Bougie, Olive	1.25
		Probe, Double	.50	1343	81	Silver Probes, Pocket Case, per pair	.75
	202	Set of Ear Instruments	35.00			See also Probes.	
2073	193	Set of 7 Instruments and Handle, in Case	12.00			Silver Wire for Suture, per coil	.50
						Simon, see Siemon.	
2069	193	Tongue Depressor	2.50	3821	552	Simpson's Cephalotribe	15.00
	59	Seymour's General Operating Set	176.70	3819	552	Cranioclast	10.00
4267	739	Shaffer's Ankle Support, each	6.00 to 8.00	3609	505	Hysterotome	7.00
4188	701	Ball and Socket Pivot	20.00 to 25.00	3782	546	Obstetrical Forceps, Long	8.00
4263	739	Club-foot Extension Apparatus, each,				Obstetrical Forceps, Short	7.00
			10.00 to 12.00	3800	549	Perforator	3.00
4065	644	Hip Splint	30.00 to 35.00			Tarnier's Obstetrical Forceps	16.00
4096	659	Knee Extension Splint	50.00 to 60.00	3579	501	Uterine Dilator	4.50
4145	686	Plaster Zone		3568	499	Uterine Dilators, Set of 12	7.50
2615	292	Scoop	8.00			Uterine Porte Caustic	2.50
1549	99	Shears, Rib	6.00			Uterine Sound	1.25
		Rib, Plain	5.00	3364	474	Uterine Sound, Graduated	1.50
		Plaster Bandage, see Bandage Shears.		2501	269	Simrock's Laryngeal Forceps	4.50
1689	121	Sherwell's Cutipuncture	5.00	2441	259	Laryngoscope	9.00
4317	755	Laryngeal Scissors	14.00	2152	205	Nasal Speculum	1.50
4318	755	Laryngeal Scissors	7.00	2000	183	Otoscope, with Lens	4.00
4315	755	Nasal Scissors	5.00	2202	213	Polypus Forceps	2.50
4316	755	Nasal Scissors	7.00	2172	208	Rhinoscope	8.00
4129	674	Short Ankylosis Knee Splint	25.00 to 30.00	2098	196	Scissors for the Ossicula Auditus	4.50
1028	5	Cedar Stethoscope	.75	3685	519	Sims' (H. Marion) Abdominal Protectors	
4305	752	Leg Apparatus, Bigg's	35.00			and Skewers	4.00
4203	710	Leg Extension (Patten)	9.00	3632	510	Curette	3.00
4204	710	Leg Extension and Weak Ankle Brace	18.00	3727	532	Drainage Tube	1.50
3837	561	Shot Compressor	2.50			Inhaler	1.50
		Perforated, per 100	.30	3688	520	Ovariectomy Director	1.50
		Shoulder Braces (for Round Shoulders):		2648	300	Rectal Speculum	5.50
4157	690	Elastic Shoulder Brace	2.00 to 3.50	3551	496	Stem Pessary	1.75
4158	690	Elastic Shoulder Brace	2.00 to 3.50			Urethral Speculum	4.50
4156	689	Nyrop's Spring Brace	18.00	2335	233	Sims' (J. Marion) Adjuster	1.50
4159	690	Steel Back Brace	4.00 to 5.00	2337	233	Adjuster	1.50
4160	690	Stillman's Spondylitis Brace	35.00 to 50.00	3277	451	Adjuster	1.50
3982	611	Shoulder Dislocation Brace	6.00 to 9.00	2650	300	Anal Dilator	4.50
3940	592	Shrady's Splint for Colles' Fracture	2.00	3219	443	Bivalve Speculum	5.00
1635	110	Subcutaneous Saw and Knife	7.00	3275	450	Blunt Hook	1.25
1636	111	Subcutaneous Saw and Knife, Angular		3387	476	Caustic Forceps	3.50
			7.00	3631	510	Curette	1.75
1637	111	Subcutaneous Saw and Knife, Improved	8.00	3632	510	Curette	3.00
3976	608	Shrimpton's Forceps	3.00	3250	448	Depressor	1.50
		Shufford's Hæmorrhoidal Needle	2.50	3251	448	Double Depressor	1.50
4398	769	Rectum Speculum		3559	497	Double Tenaculum	3.50
2154	205	Shurley's Nasal Speculum, with Ivory Slide,		3677	516	Ecraseur, Porte Chain	35.00
		Right and Left, each	3.50	3652	512	Enucleator	3.50
1904	163	Sichel's Iris Knife	1.75	3653	512	Enucleator Blunt Hook	3.50
1906	163	Sichel-shaped Iris Knife	1.75	3287	452	Holder and 4 Knives	10.00
2019	185	Siegle's Otoscope	5.00	3293	452	Knife, Probe-pointed	1.50
3640	511	Siemon's Curette, Blunt	2.50	3282	452	Knife, Rotating	4.50
2741	311	Curette, Scoop	2.50	1320	79	Needle, per dozen	1.50
3641	511	Curette, Sharp	2.50	1337	81	Needle Forceps	2.50
3335	461	Retractor, Plain	3.00	2712	309	Needle Forceps	2.50
3334	461	Retractor, Serrated	3.50	3303	454	Needle Forceps	2.50
		Retractors, Set of 5, and 1 Handle	9.00	3305	454	Needle Forceps, with Catch	4.00
3332	461	Set of 4 Simon-Bozeman's and 4 Simon-Sims' Specula, with 2 Socket Handles	20.00	3466	489	Pessary Introducer	8.00
3333	461	Set of 8 Flat Shaped Specula, with 2 Socket Handles	20.00	3677	516	Porte Chain Ecraseur	35.00
1064	10	Sieveking's Æsthesiometer	4.00	2338	233	Pulley	1.25
2904	350	Sigmund's P. P. Syringe	.75	3276	450	Pulley or Fork	1.25
				3282	452	Rotating Knife	4.50
				3288	452	Scalpel	1.50
				3295	453	Scissors, Curved, Blunt Pointed	4.50
				3281	452	Scissors, Curved, Sharp Pointed	4.50

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
3296	453	Sims' (J. Marion) Scissors, Straight	\$3.50	2835	336	Skinner's Phimosis Forceps	\$2.50
3278	451	Scissors, Wire Cutting	3.50	121		Skin Grafting	
3273	449	Seizing Forceps	3.00	1677	130	Grafting Scissors	10.00
3279	451	Sigmoid Catheter, Hard Rubber	1.00	3942	594	Skinner's Fracture Bed	25.00
3279	451	Sigmoid Catheter, Metal	.75			Skull, see Osteological.	
3279	451	Sigmoid Catheter, Silver	1.50	3485	490	Sleigh Pessary	.75
3212	442	Speculum	2.50	3366	474	Sliding Uterine Sound	3.00
3219	443	Speculum, Bivalve	5.00	3803	549	Smellie's Perforator	2.50
3274	450	Sponge Holder	.75	3508	492	Smith's (Albert H.) Pessary	.50
3537	495	Stem Pessary	2.00	2209	215	Smith's (Andrew H.) Canula Scissors	5.00
3386	475	Tampon Screw	1.25	2081	194	Ear Syringe	4.00
2336	233	Tenaculum	1.25	2191	211	Nasal Applicator	2.50
3256	449	Tenaculum	1.25	2163	206	Nasal Speculum	1.50
3559	497	Tenaculum, Double	3.50	2188	211	Powder Blower	3.00
3264	449	Tenaculum, Long	1.25	2859	344	Smith's (George K.) Urethroscope	8.50
2339	234	Twisting Forceps	3.00	2984	370	Urethrotome	30.00
3278	451	Twisting Forceps	3.00	2739	311	Wire Ecraseur, Curved	6.00
3587	502	Uterine Dilator, Three Bladed	12.00	3669	515	Wire Ecraseur, Curved	6.00
		Uterine Dilator, Two Bladed	6.00	3668	515	Wire Ecraseur, Straight	5.00
3425	483	Uterine Elevator, No. 1	6.00			Smith's (Gregg) Clamp and Knife, Right	
3426	483	Uterine Redressor, No. 2	6.00			and Left, each	10.00
		Uterine Sound	1.25	2732	311	Smith's (Henry) Cauteries, Serrated, per set	6.00
		Uterine Stem, Glass	.25	2314	231	Harelip Forceps	5.00
	470	Uterine Surgery Set	125.00	2734	311	Pile Clamp	6.50
3213	442	Vaginal Dilator, Glass	.50	2496	268	Smith's (Heywood) Scissors	12.00
3213	442	Vaginal Dilator, Hard Rubber	.75	4297	749	Smith's (H. M.) Brace for Femur	50.00 to 75.00
	462	Vesico-Vaginal Fistula Set	55.00	4299	749	Brace for Forearm	35.00 to 60.00
	462	Vesico-Vaginal Fistula and Uterine		4300	750	Brace for Humerus	35.00 to 70.00
		Set	75.00	4298	749	Brace for Tibia	30.00 to 40.00
3646	512	Vulsellum Hook	5.50	3975	608	Smith's (Nathan R.) Anterior Splint	3.00
3277	451	Wire Adjuster or Fulcrum	1.50	3128	419	Lithotome	12.00
3278	451	Wire Cutting Scissors	3.50	3938	592	Smith's (Samuel W.) Arm Splint	
3278	451	Wire Twisting Forceps	3.00	3984	612	Clavicle Apparatus	
		Skeleton, Human, see Osteological.		4040	620	Smith's (Stephen) Aseptic General Operat-	
4355	760	Skene's Buttonhole Scissors	6.50			ing Set	200.00
4356	760	Cervix Needles, per doz	1.50	4038	628	Aseptic Pocket Case, Compact	18.00
3717	530	Compressing Forceps	5.50	4039	628	Aseptic Pocket Case, Large	29.00
3828	557	Counterpressor	1.50			Aseptic Pocket Case, Medium	28.00
3637	511	Curette	1.75	4166	692	Corset, with Serpentine Springs	20.00
3500	491	Cystocele Pessary	2.00	4068	645	Hip Splint	9.00
3341	466	Double Perforated Catheter	2.00	4199	708	Paralysis Apparatus	40.00 to 50.00
3432	468	Elevator and Curette	10.00			Snare, see Wire Snare.	
3346	467	Endoscope	2.75	1761	145	Snellen's Entropium Forceps	2.50
2861	344	Endoscope	2.75			Snowden's Eye Speculum	
3349	469	Fissure Knife and Probe, each	.75			Stethoscope	2.50
3348	468	Folsom's Speculum	1.50	1156	24	Soles, Voltaic Armadillo, per pair	1.00
2862	344	Folsom's Speculum	1.50	3143	423	Sond à Dard	3.50
2710	308	Hæmorrhoidal Clamp	6.00	3144	423	Helmuth's	6.00
3826	556	Hawk-bill Scissors	10.00			Sounds:	
3342	466	Instillation Tube	.50	2973	365	Bulbous, Otis', Set of 33 and Handle	17.50
3395	476	Instillation Tube	.50	2930	354	Conical, Steel, Curved	1.25
3827	556	Needle Forceps	5.50	2929	353	Conical, Steel, Straight	1.25
3713	529	Ovariectomy Caution Clamp	15.00	2925	352	Cooling, Winternitz's, Silver	4.00
2722	309	Perineum Needle	1.75			Cooling, Winternitz's, Soft Rubber	2.50
3843	561	Perineum Needle	1.75	1790	147	Cupped, Brewster's Lachrymal	2.50
4354	760	Pessary for Prolapsus of the Bladder	2.00	2915	351	Cupped, Van Buren's	2.00
3350	469	Reflux Catheter	2.00	3065	400	Cylindrical	1.00
3267	449	Seizing Forceps	2.00	1226	36	Electrode	.75
3268	449	Seizing Forceps, with Lock	3.00			Electrolysis, Newman's	3.00
3280	451	Self-retaining Catheter	1.00	3065	400	for Stone in the Bladder	1.00
3340	466	Self-retaining Catheter	1.00	3071	400	for Stone in the Bladder, with Bill-	
3374	474	Sound	3.50			roth's Sounding Board	2.50
3618	506	Sound and Scarificator	6.00			See also Stone Searchers.	
3825	556	Tenaculum Forceps	3.00	2851	342	Gouley's Conical, Steel	1.25
3347	467	Urethral Speculum	2.50	2930	354	Gouley's Conical, Steel	1.25
2854	343	Urethral Speculum	2.50	2939	356	Gouley's Tunnelled	2.50
3339	465	Urinal Cup Pessary	2.50	1790	147	Lachrymal, Brewster's	2.50
	396	Uro-Cystic and Urethral Set	63.35	2886	347	Otis', Bulbous, each	.50
3830	557	Uterine Sector	11.00	2973	365	Otis', Bulbous, Set of 33 and 1 Handle	17.50
	471	Uterine Set of Instruments	54.25			Otis', Conical Steel	1.25
3374	474	Uterine Sound	3.50	2931	354	Teft's	1.25
		Vulsellum Forceps	3.00			Uterine, see Uterine Sounds.	
4341	759	Wire Ecraseur	7.50	2930	354	Van Buren's Conical	1.25
1426	58	Skey's Arterial Compressor	24.00				

FIG.	PAGE.	PRICE.
2935	355	Sound, Weisse's..... \$1.00
4360	763	Wyeth's, Straight or Curved..... 1.25
		Southey's Drainage Trocar and 4 Canulas..... 5.00
2769	318	Spanton's Strophotome..... 2.00
1831	150	Spatula, Eye, German Silver..... 1.25
1831	150	Eye, Hard Rubber..... .75
1296	76	Pocket Case, Hard Rubber..... .60
1296	76	Pocket Case, Steel..... .60
1297	76	Spatula and Elevator, Pocket Case..... .60
		Speculum, Anal, see Rectal Specula.
		Ear, see Aural : Diagnostic, Speculum.
		Eye, see Ophthalmic : Speculums ; also
		Ophthalmic, Palpebral : Lid Holder.
		Nasal, see Nasal Speculum.
		Oris, see Cheek Retractor, Gag, Lock-
		Jaw Instruments, Tongue Depressor.
		Rectal, see Rectal Specula.
		Urethral, see Endoscope.
		Uterine, see Uterine Dilator.
		Vagina, see Vaginal Specula.
		Speculum Chairs, see Operating Furniture.
1487	94	Speir's Artery Constrictor..... 4.00
2048	191	Ear Curette..... 1.25
1999	183	Ear Speculum, Self-retaining..... 3.00
2010	184	Ear Speculum, Wire..... 1.50
1054	7	Echoscope..... 6.00
1796	147	Lachrymal Catheter..... 1.00
1254	46	Speirs-George's Ether Inhaler..... 3.50
		Spencer Wells, see Wells.
2924	352	Spermatorrhoea Ring..... .75
1070	11	Sphygmograph, Dudgeon's..... 25.00
1072	11	Marey's (imported to order)..... 75.00
2289	227	Spicula Forceps, Goodwillie's..... 2.00
		Spinal Braces :
		for Angular Curvature, Caries, Spon-
		dylitis, Pott's Disease or Pos-
		terior Curvature :
4144	685	Andrews' Spine Brace..... 20.00
4136	678	Davis' Apparatus for Caries..... 20.00
4142	684	Sayre's Jury Mast..... 12.00
4140	682	Sayre's Plaster of Paris Jacket.....
4143	685	Sayre's Plaster of Paris Jacket
		and Jury Mast.....
4141	683	Sayre's Suspension Apparatus,
		Japanned..... 8.00
4141	683	Sayre's Suspension Apparatus,
		Nickel-plated..... 12.00
4145	686	Shaffer's Plaster Zone Apparatus,
4162	691	Stillman's Antero-Posterior Brace,
4163	691	Stillman's Antero-Posterior Brace
		with Head Rest..... 60.00
4148	687	Stillman's Lever Brace..... 35.00
4150	687	Stillman's Lever Brace, with Cor-
		set..... 40.00
4160	690	Stillman's Spondylitis Brace.....
		35.00 to 50.00
4137	678	Taylor's Apparatus for Caries,
		24.00 to 30.00
4152	688	Tiemann's Brace for Posterior
		Curvature..... 35.00
4138	679	Washburn's Spine Brace, 15.00 to 20.00
		See also Shoulder Braces.
		for Anterior Curvature (Lordosis) :
4167	692	Delicate Brace..... 40.00
4165	692	Felt Jacket, Porous..... 25.00
4165	692	Felt Jacket, Russian..... 25.00
4166	692	Smith's Corset..... 20.00
		for Antero-Posterior Curvature :
		See Shoulder Braces, also Spinal
		Braces for Angular Curvature.
		for Scoliosis, Lateral or Rotary La-
		teral Curvature :
4170	694	Barwell's Scoliosis Brace, 12.00 to 15.00
4171	694	Barwell's Scoliosis Brace, 12.00 to 15.00

FIG.	PAGE.	PRICE.
		Spinal Braces, for Scoliosis, &c. :
4169	694	Barwell's Sloping Seat.. \$10.00 to \$15.00
4186	699	Roberts' Spinal Extension Jacket,
		20.00 to 30.00
4174	696	Sayre's Plaster Jacket.
		Knitted Shirts..... 2.00 to 4.00
		Lacing and Trimming Jacket,
		6.00 to 12.00
4173	695	Sayre's Self-Suspension.
		Apparatus, with Pulleys and
		Hook, Japanned..... 8.00
		Apparatus, with Pulleys and
		Hook, Nickel-plated..... 12.00
4172	694	Apparatus with Tripod,
		18.00 and 22.00
		Tripod alone..... 10.00
4175	696	Squire's Spineyard..... 7.50
4184	699	Stillman's Horizontal Frame.....
4182	699	Stillman's Vertical Extension
		Brace..... 30.00 to 40.00
4183	699	Stillman's Vertical Frame.....
4181	698	Stillman's V Lever Brace, 50.00 to 60.00
4180	698	Stillman's V Lever Brace and Cor-
		set, Combined..... 50.00 to 60.00
4176	697	Tiemann's Scoliosis Brace..... 35.00
4177	697	Tiemann's Scoliosis Brace, Extra
		Fine and Light..... 40.00
4185	699	Wolff's Spinal Cradle.... 10.00 to 15.00
		for Torticollis, Wry-Neck :
4192	702	Markoe's Torticollis Brace,
		35.00 to 45.00
4187	700	Post's Torticollis Helmet..... 12.00
4191	701	Richter's Torticollis Brace.....
4195	703	Roberts' Jury-mast..... 25.00
4194	703	Roberts' Torticollis Brace..... 25.00
4188	701	Shaffer's Ball and Socket Pivot for
		Malformation of the Head,
		20.00 to 25.00
4190	701	Stillman's Lever Brace, with At-
		tachment for Cervical Caries,
		45.00 to 50.00
4193	702	Torticollis Brace..... 80.00 to 90.00
4189	701	Wood's Head Rest..... 5.00
1244	40	Spinal Ice or Hot Water Bags..... 2.00 to 4.00
4175	696	Spineyard, Squire's..... 7.50
1199	34	Spiral Electrode, Uterine or Urethral..... 1.25
2567	282	Spirometer, Barnes'..... 10.00
2562	281	Brown's..... 10.00
2563	281	Hutchinson's..... 32.00
		Tiemann's..... 10.00
		Splint, see Fracture, also Orthopaedic : Dis-
		eases of the Joints.
4290	746	Splinter Forceps..... 1.00
2285	227	Splitting Forceps, Dental..... 2.75
2291	227	Splitting Forceps, Dental, Goodwillie's..... 2.75
1439	89	Spohn's Rubber Ring Tourniquet, 7 in Set.. 3.50
		678 Spondylitis.
1182	33	Sponge Covered Electrode, Long Handle.. 1.50
1220	35	Cup Electrode..... .50
1187	33	Cup Electrode..... 1.00
3600	504	Dilator, Emmet's..... 2.50
4329	756	Forceps, Cohen's, 3 sizes, each..... 4.00
1224	35	Holder and Current Breaker..... 4.00
1186	33	Holder (Electrode)..... .50
3255	448	Holder, German Silver..... .75
3254	448	Holder, Iron, Ebony Handle..... .75
		Holder, Laryngeal, see Laryngeal Ap-
		plicators.
3604	504	Tent, per dozen..... 1.50
3562	498	Tent, Wallace's, each..... 1.50
3563	498	Tent Expeller..... .75
3564	498	Tent Expeller..... .75
3567	498	Tent Expeller..... .75
3565	498	Tent Expeller, Willhoft's..... 4.00

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
3863	569	Spools and Jar, Ligature.....\$	2343	234	Needle, Bent.....\$2.00
4397	769	and Jar, Ligature, Ware's.....1.50	2341	234	Needle, Curved.....2.00
1691	121	Spoon, Piffard's, each.....2.25	2346	235	Needle, Goodwillie's, per set.....12.00
4386	766	Volkmann's.....2.50	2348	235	Needle, Prince's.....10.00
		See also Curette.	2352	235	Needle, Prince's Tenaculum Needle.....10.00
	251	Spray.	2334	233	Needle, Whitehead's Spiral.....1.75
		Spray Apparatus:	2333	233	Periosteotome, Sayre's.....2.00
2421	250	Air Receiver.....	2332	233	Periosteotome, Whitehead's.....1.50
2422	251	Air Receiver.....	2328	232	Scissors.....4.50
2423	251	Air Receiver.....	2325	232	Seizing Forceps.....2.50
2424	251	Air Receiver.....	2327	232	Seizing Forceps, Durham's.....4.50
		Antiseptic, see Antiseptic Spray.	2326	232	Seizing Forceps, Langenbeck's.....2.50
1239	39	Cautery, Wight's, Complete.....11.00	2324	232	Seizing Forceps, Whitehead's.....4.50
	250	for Direct Medication:	2361	236	Suture Holder, Langenbeck's.....3.00
2600	238	Burrall's.....1.75	2330	232	Tenaculum.....1.25
2431	253	Hand Atomizer.....1.50	2342	234	Tenaculum, Blunt.....2.00
2430	253	Hand Atomizer, Hard Rubber.....3.00	2360	236	Tenaculum, Langenbeck's.....1.50
2420	251	Leffert's Compressed Air Appa- tus, Complete.....	2336	233	Tenaculum, Sims'.....1.25
		Millard's, No. 2.....1.50	2352	235	Tenaculum Needle, Prince's.....10.00
1259	48	Richardson's, 3 Hard Rubber Tubes.....3.00			Wire Suture:
1259	48	Richardson's, 1 Silver Tube.....5.50	2335	233	Adjuster, Sims'.....1.50
		Richardson's, 3 Silver Tubes.....6.50	2337	233	Adjuster, Sims'.....1.50
2427	252	Spray Tube, with Bayonet Fitting,	2338	233	Pulley, Sims'.....1.25
2426	252	Spray Tube, with Bayonet Fitting and Cut-off.....	2339	234	Twisting Forceps, Sims'.....3.00
2428	252	Spray Tube, with Plain End.....			Startin's Wire Needle, Hollow.....5.00
	201	for Eustachian Canal:	2580	234	Steam Atomizer, Clinton.....1.75
2143	201	Hackley's Instrument.....6.50			Codman's.....5.00
		for Inhalation, see Inhalers.	2582	234	Seeger's.....12.00
2417	249	Nasal, Leffert's.....4.00	2581	234	Tiemann's.....5.00
		Nasal, Millard's.....1.50			See also Antiseptic Spray.
2598	237	Tubes and Stand.....	2603	238	Steam Jacket, May's.....35.00
4295	747	Spring, for Inverted Nail......25	1468	93	Stearns' Artery Claw Forceps.....8.00
1648	115	Lancet, Button Trigger.....2.50	2983	370	Dilating Urethrotome.....12.00
1649	115	Lancet, Spring Trigger.....1.50	2947	359	Dilator.....5.00
1647	115	Lancet, Tiemann's.....2.50	4159	690	Steel Back Shoulder Brace.....4.00 to 5.00
3547	496	Tent, Wallace's, each.....1.50			Sound, see Sound.
1833	150	Spud, Dix's Foreign Body.....1.25	3401	618	Spike for Transfixion of Bone......75
1679	120	Piffard's Scarifying.....1.25			Staff, see Lithotomy Staff.
1839	150	Spud and Needle.....2.50	2383	238	Tongue Depressor, Folding.....2.50
1250	44	Squibb's Ether Inhaler.....1.50	2225	219	Steel's Septum (Punch) Forceps.....10.00
3936	591	Squire's Forearm Splint.....1.00 to 1.50	3344	467	Stein's Urethral Dilator, 3 Bladed.....6.00
4175	696	Spineyard.....7.50			Urethral Dilator, 4 Bladed.....10.00
3035	387	Vertebrate Catheter.....6.00			Ureter Evacuator.....12.00
		Staff, see Lithotomy Staff, also Urethro- tomy, External.			Stem Pessaries:
	62	Staff Surgeons' Capital Operating Set.....137.10	3529	494	Ball's.....1.50
	62	Surgeons' Minor Operating Set.....198.00	3541	495	Chamber's, with Introducer.....3.00
2301	229	Stag-foot Elevator.....1.00	3530	494	Cole's, Galvanic.....2.00
3872	573	Stanchion for Counter Extension.. 5.00 to 8.00	3534	494	Coxeter's.....1.50
2614	292	Stanford's Bristle Probang.....2.50	3539	495	Donaldson's.....2.00
	232	Staphyloraphy:	3542	495	Edward's.....3.00
2340	234	Bistoury, Curved.....2.00	3543	495	Kinloch's.....2.00
2342	234	Blunt Hook.....2.00	3536	494	Mossman's.....5.00
2345	234	Knife, Curved, Right or Left.....1.75	3535	494	Peaslee's.....1.50
2344	234	Knife, Double-edged.....2.50	3549	496	Perry's.....5.00
2349	235	Knife, Goodwillie's.....1.50	3551	496	Sims' (H. M.).....1.75
2350	235	Knife, Goodwillie's.....1.50	3537	495	Sims' (J. M.).....2.00
2351	235	Knife, Goodwillie's.....1.50	3527	494	Stem Pessary......50
2354	236	Knife, Langenbeck's.....2.50	3531	494	Stem Pessary, each......75
2355	236	Knife, Langenbeck's.....2.50	3532	494	Stem Pessary......50
2356	236	Knife, Langenbeck's.....2.50	3545	495	Thomas'.....2.50
2357	236	Knife, Langenbeck's.....1.75	3533	494	Thomas', Galvanic.....1.50
2358	236	Knife, Langenbeck's.....1.75	3548	496	Van de Warker's Anteflexion.....1.75
2359	236	Knife, Langenbeck's.....2.00	3550	496	Van de Warker's Retroflexion.....1.75
2331	233	Knife, Whitehead's, Gum.....1.50	3547	496	Wallace's.....1.50
2332	233	Knife, Whitehead's, Hoe.....1.50	3546	495	Weber's.....4.50
2329	232	Knife, Whitehead's, Paring.....1.50	3538	495	Wilhoff's......75
2367	237	Mouth-Gag, Annandale's.....7.00	1063	9	Stethometer, Carroll's.....3.00
2347	235	Mouth-Gag, Goodwillie's.....7.00	1062	9	Quain's.....10.00
2323	232	Mouth-Gag, Whitehead's.....12.00		9	Stethometric.
		See also Gag.			Stethoscopes:
			1040	6	Allison's, Differential.....4.50
			1035	5	Arnold's, Flexible.....1.50
			1021	5	Barclay's.....1.25

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Stethoscopes:		4160	690	Stillman's Spondylitis Brace....	\$35.00 to \$50.00
1042	6	Bartlett's	\$7.00	4180	698	V Lever Brace and Corset Combined,	50.00 to 60.00
1027	5	Burrows'	2.25				30.00 to 40.00
1036	6	Cammann's Binaural, with Snelling's		4182	699	Vertical Extension Brace	
		Rubber Bell.....	4.50	4183	699	Vertical Frame	
1038	6	Cammann's Cylindrical Auscultator..	1.25	4125	669	Wrist Splint	25.00
1037	6	Cammann's Intra-Costal Auscultator,	1.50	1702	123	Stimson's Hypodermic Syringe	3.00
1032	5	Cedar, Hard Rubber Ear Piece	1.50	1338	81	Needle Holder and Cutting Forceps ..	3.50
1028	5	Cedar, Short	.75	2810	330	Stockings, Elastic. Prices on Page 330.	
1039	6	Cedar, Vulcanite Ear Piece	1.50			Stoehrer's Galvanic Battery, see Battery,	
1030	5	Clark's	1.25			Galvanic.	
1041	6	Davis'	4.50	2471	265	Stoerk's Drop Tube	2.25
		Denison's	12.00	1769	145	Stoke's Eyelid Compressor	3.00
1025	5	Dobell's	1.50	1031	5	Stethoscope	1.00
1024	5	Elliottson's	5.00	1616	107	Stohlmann's Bead Saw	6.00
1033	5	Ferguson's	1.50	3612	505	Hysterotome	7.00
1020	5	Flexible	1.25	3189	435	Speculum Vaginæ	8.00
1022	5	Hawksley's	1.25		293	Stomachal: for Instrumental Introduction	
1045	7	Holden's Resonator.....	2.50			of Food into, and Lavage of the	
1043	6	Knight's	7.50			Stomach:	
		Laenec's	7.00	2624	295	Gastro Mundator, Tiemann's.....	8.50
1026	5	Loomis'	1.75	2625	296	Hegar's Infusor	
1023	5	Martin's Combination	5.00	2628	296	Korup's Apparatus	
		Palmer's	7.50	4391	767	Lavage Apparatus.....	2.50
1034	5	Quain's Telescopic	2.00	2631	297	Masticator	8.00 and 12.00
1028	5	Short Cedar.....	.75			Stomach Pumps:	
1054	7	Speir's Echoscope	6.00	2619	294	Hollow Piston.....	10.00
1031	5	Stokes'	1.00	2624	295	Tiemann's Gastro Mundator	8.50
1029	5	Walsh's	1.00	2618	293	Tiemann's Lever Pump.....	16.00
1044	7	Ware's	4.50	2623	295	Toswill's	2.50
1734	190	Steurer's Aspirator.....	35.00			Stomach Tube:	
2950	359	Urethral Dilator.....	8.00			English	1.50
		Stevens' Eye Speculum	2.00	2627	296	English, Funneled End	1.75
		Sub-conjunctival Tenotomy Scissors,	4.50	2622	294	English, Funneled End	1.75
		Tendon Hook	1.25	2626	296	French	1.00
		Toothed Forceps	2.00	2620	294	Paine's Nasal Feeding Tube.....	1.00
2759	316	Stewart's Hernia Knife.....	5.00	2621	294	Tiemann's Patent "Velvet Eye," Soft	
1803	148	Stillling's Knife, for Stricture in the Lach-				Rubber	1.50
		rymal Passages.....	1.50	2621	294	Tiemann's Patent "Velvet Eye," Soft	
4258	736	Stillman's Ankle Brace with Clamps,				Rubber, Long	2.00
			15.00 to 20.00	2629	297	Stomach Tube Attachment for Aspirator ..	6.00
4114	668	Ankle Splint	15.00 to 20.00		463	Stone in the Bladder:	
4162	691	Antero-Posterior Brace, Spinal	35.00		400	Female.	
4163	691	Antero-Posterior Brace, with Head-			401	Male.	
		Rest.....	60.00		401	Methods of Removal.	
4227	719	Bow-Leg Brace, Long, pair ..	30.00 to 40.00		413	Operations, Ancient.	
4228	719	Bow-Leg Brace, Short, pair ..	20.00 to 25.00		414	Operations, Modern.	
4008	620	Bracket, Ankle				See also Litholapaxy, Lithotomy,	
3997	618	Bracket, Elbow				Lithotrity.	
3969	604	Bracket, Knee				Stone Searchers:	
3998	618	Bracket, Wrist		3070	400	Andrew's.....	2.50
3933	591	Bracket, Wrist		3071	400	Billroth's Sounding Board	1.50
4102	661	Bracket and Sector.....	10.00	3071	400	Billroth's Sounding Board and Sound,	2.50
4117				3066	400	Gouley's.....	1.50
TO	608	Cable Splint.		4411	770	Keyes'	4.00
4124					400	Langlebert's Lithophone	
4262	738	Club-foot Twister			400	Little's.....	3.50
4075	648	Hip Joint Brace, No. 1	45.00	3069	400	Otis' Exploring Sound.....	5.50
4076	648	Hip Joint Brace, No. 2.....	40.00	3065	400	Steel Sound	1.00
4184	699	Horizontal Frame		3068	400	Thompson's.....	4.00
4103	661	Knee Extension Brace	35.00 to 40.00	3072	400	Thompson's.....	4.00
4107	662	Knee Splint, with Large Sectors	40.00	3073	400	Thompson's Measure	12.00
4220	716	Knock-Knee Apparatus.....	30.00 to 40.00	1655	115	Stopecock, Brass, for Cupping Pump	.50
4147				1825	149	Eye Douche, Hard Rubber	1.00
TO	687	Lever Spinal Brace	35.00		389	Keyes' Two-way	2.50
4149				3711	529	Storer's Clamp Shield	11.00
4190	701	Lever Spinal Brace, with Attachment		3205	441	Speculum Vaginæ	4.00
		for Cervical Caries	45.00 to 50.00	3622	506	Uterine Scarificator	6.00
4279	743	Local Eversion Brace.....		1563	100	Stout Tenaculum, Double	2.50
	313	Method for Radical Cure of Hæmorrhoids without an Operation.		1562	100	Single	2.00
4102	661	Sector and Knee Bracket.....	10.00	1564	100	Triple	2.50
4107	662	Sector, attached to Knee Splint.....	40.00	3430	483	Stowe's Retroversion Elevator.....	4.50
4074	648	Sector Splint.....	10.00	1758	144	Strabismometer, Galezowsky's	6.00
				1759	144	Laurence's.....	2.25

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
		Tait's Ovariectomy Trocar, Plain.....	3260	449	Tenaculum, Perry's, Barbed.....
		Screw Forceps.....			Pocket Case, Plain.....
		Taliaferro's Obstetrical Forceps.....	1410	86	Pocket Case, Slide Catch.....
3477	489	Recto-Displacement Pessary.....	3256	449	Sims'.....
3221	443	Speculum Vaginæ.....	3264	449	Sims', Long.....
3476	489	Universal Pessary.....	2330	232	Staphyloraphy.....
		Talipes, see Orthopædic: Deformities of	2396	243	Tenaculum Forceps.....
		the Feet.....	3556	497	Byrne's.....
2195	212	Tampon, Epistaxis.....	3829	557	Cowan's.....
2557	279	Tracheal, Gerster's.....	3558	497	Emmet's.....
4223	756	Tracheal, Gerster's Latest.....	3553	497	Hanks'.....
		Tracheal, Lange's.....	3559	497	Sims'.....
2559	279	Tracheal, Trendelenburg's.....	3825	556	Skene's.....
3410	478	Tampon Expeller, Vaginal, Barnes'.....	3557	497	Wooster's.....
3411	478	Vaginal, Braun's.....	3554	497	Wylie's.....
3412	478	Vaginal, Thomas'.....			Tendo Achilles:
1991	178	Tansley's Lachrymal Syringe.....	4269	740	Talipes Equinus Shoe, each... 8.00 to 12.00
4404	769	Tape Measure, Linen (according to length),	4271	740	Talipes Equinus Shoe, Hud-
		Steel (according to length).... 1.50 to 1.50			son's, each..... 12.00 to 18.00
		5.00	4270	740	Talipes Equinus Shoe, Sayre's,
2536	277	Tardieu's Trachea Scissors.....			each..... 10.00 to 15.00
3813	551	Tarnier's Basiotribe.....			Tenotomes:
3776	542	Obstetrical Forceps.....	1517	96	Aseptic.....
		Obstetrical Forceps, 1887.....	1518	96	Aseptic.....
3735	536	Tarsitani's Obstetrical Forceps.....	1519	96	Aseptic.....
1684	121	Tattooing Instrument, Piffard's.....	1520	96	Aseptic.....
		See also Ophthalmic: Tattooing.	1374	84	Blunt-pointed.....
		321 Taxis.....	1372	84	Concave-edged.....
4266	739	Taylor's Ankle Support.....	1373	84	Convex-edged.....
3806	550	Blunt Hook.....			Pocket Case, Plain.....
4064	643	Long Splint, Hip Joint.....	1407	86	Pocket Case, Slide-catch.....
3746	538	Obstetrical Forceps.....	1416	86	Pocket Case, Double.....
2839	337	Phimosi Scissors.....	1375	84	Sharp-pointed.....
		Set of Obstetrical Instruments.....			Tents, Elm, Curved, per dozen.....
3238	446	Speculum Vaginæ.....			Elm, Hollow, per dozen.....
4137	678	Spine Brace.....			Elm, Solid, per dozen.....
2840	337	Syringe, Sub-preputial.....			Sea Tangle, Hollow, per dozen.....
1971					Sea Tangle, Solid, per dozen.....
1973	173	Teale's Cataract Exhauster, in Case.....	3604	504	Sponge, per dozen.....
2997	375	Probe Gorget.....	3547	496	Spring, Wallace's, each.....
		Teevan's Lithotomy Forceps, Fenestrated,	3560	498	Tupelo, Hollow, per dozen.....
3082	403	Lithotriptor, Handle.....	3561	498	Tupelo, Solid, per dozen.....
3087	404	Lithotriptor, Jaws.....	1901	162	Test Drum.....
		Retention Catheter.....			1 Tubes and Stand.....
2958	302	Stricture Cutter.....			Tube Stand.....
2931	354	Teft's Sound.....	1802	148	Teulon's Canalicula Instrument.....
2035	188	Telescopic Ear Trumpet.....	3687	520	Thallon's Ether Inhaler.....
3173	431	Speculum, Thomas'.....	2652	300	Thebeaud's Sphincter Ani Dilator.....
1669	120	Teller's Vaccinator.....	2951	359	Urethral Stricture Dilator.....
1395	85	Tenaculum.....	1791	147	Theobald's Probes, per set.....
1489	95	Amputating.....	1870	154	Strabismus Hook.....
1494	95	Amputating.....	1237	39	Thermo-Cautery, Paquelin's.....
3263	449	Bozeman's.....			Thermometer, see Clinical Thermometer.
3266	449	Bozeman's, Long.....	4378	765	Thiersch's Spindles and Forceps.....
2711	308	Byrne's, Double.....	1156	24	Thigh Band, Voltaic Armadillo.....
3262	449	Double.....	2846	340	Thomas' (C. H.) Gauge.....
1563	100	Double, Stout.....	4304	751	Thomas' (Hugh Owen) Artificial Leg, above
3257	449	Emmet's.....			Knee..... 15.00 to 20.00
3258	449	Emmet's.....	4303	751	Artificial Leg, below Knee... 15.00 to 20.00
3261	449	Emmet's.....	4071	646	Posterior Splint, with Patten, for Hip-
3265	449	Emmet's.....			Joint Disease..... 12.50
3558	497	Emmet's, Double.....			597 Crutches. Prices on page 597.
3259	449	Emmet's, Heavy Shank.....	3513		
1377	84	Feruled.....	3515	493	Thomas' (T. Gaillard) Anteflexion Pessary.. 2.00
3142	423	Keith's.....	3516		
1387	84	Little's.....	3518	493	Anteversion Pessary.....
3270	449	Long, Angular.....	3524	493	Anteversion Pessary.....
3271	449	Long, Stout.....	3491	491	Anteversion Pessary.....
3552	497	Nott's, for Speculum.....	3493		
1377	84	Operating, Feruled.....	3700	527	Clamp, Ovariectomy.....
1395	85	Operating, Plain.....	3710	529	Clamp, Ovariectomy.....
1563	100	Osteotomy, Double.....	4400	769	Clamp, Vaginal.....
1562	100	Osteotomy, Single.....	3814	551	Craniotomy Forceps.....
1564	100	Osteotomy, Triple.....	3630	510	Curette.....

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Thomas' (T. Gaillard) :					
3636	511	Curette	\$1.50	3052	394	Thompson's Vesical Director	\$2.50
3629	510	Curettes, 3 with one Handle	4.50	3053	395	Vesical Forceps	5.50
3203	439	Cusco's Speculum	4.00	3054	395	Vesical Forceps	5.50
3504	492	Cutter's Anteversion Pessary, with Belt	2.50	3055	395	Vesical Forceps	5.50
3506	492	Cutter's Anteversion Pessary, with Belt	2.50	2922	352	Thornton Parker's Urethral Tube	.50
3505	492	Cutter's Anteversion Pessary with Cervical Rest, with Belt	3.50	66	Three-fold Pocket Case	15.00	
3458	487	Cutter's Cup Pessary (Prolapsus)	3.50	1867	152	Three-pointed Ophthalmostate	1.50
3503	492	Cutter's Retroversion Pessary, with Belt	2.50	221	Throat.		
3507	492	Cutter's Retroversion Pessary with Cervical Rest, with Belt	3.50		Throat Forceps :		
3302	453	Dilating Forceps	3.00	2510	270	Buck's	2.50
3610	505	Double Scissors	6.00	2508	270	Burge's	4.50
3720	531	Drainage Tube, Curved	.40	2506	270	Fauvel's	6.00
3723	531	Drainage Tube, Double	3.50	2511	270	Mackenzie's Antero-Posterior	2.75
3722	531	Drainage Tube, Perforated	.60	2509	270	Mackenzie's Lateral	2.75
3721	531	Drainage Tube, Straight	.40	2507	270	Mathieu's	6.00
1658	116	Dry Cupper	1.50	2500	269	Noyes'	4.50
3619	506	Dry Cupper	1.50	2504	269	Tiemann's Flexible	4.50
3362	473	Elastic Probe	1.25			See also Laryngeal Forceps and Esophageal Forceps.	
3681	517	Forceps for Amputating the Cervix	35.00	2391	242	Throat Lancet, Buck's	2.50
3533	494	Galvanic Stem Pessary	1.50	2177	209	Thudichum's Nasal Douche	1.50
		Glass Stem Pessary	.25	2164	206	Nasal Speculum, each	.75
3354	473	Hard Rubber Probe	1.25	1646	115	Thumb Lancet, Broad-pointed	.75
3492	491	Hewitt's Retroversion Pessary	1.00	1645	115	Spear-pointed, Evans'	1.00
3545	495	Intra-Uterine Stem Pessary	2.50	1645	115	Spear-pointed, Plain	.50
		Needle for Extirpation of Uterus	4.50	1645	115	Spear-pointed, Tiemann's	.75
3752	538	Obstetrical Forceps	7.00	4231	720	Tibia Curvature Brace	12.00 to 18.00
1721	127	Ovarian Trocar	20.00			See also Fracture of Fibula and Tibia.	
3801	549	Perforator	8.00	3931	591	Tiemann & Co.'s Arm Sling	4.50
3514	493	Retroflexion Pessary, Hard Rubber	.75	1659	116	Artificial Leech	7.00
3514	493	Retroflexion Pessary, Soft Rubber	1.00	553	Aseptic Obstetrical Case	72.00	
3512	492	Retroversion Pessary	.75	1735	131	Aspirator	14.00
3693	525	Sac Forceps	3.50	1735	131	Aspirator, Small	12.00
3224	443	Self-retaining Speculum	18.00	2581	284	Atomizer, Steam	5.00
3643	511	Serrated Scoop	3.50	3876	574	Bandage Roller	3.00
	553	Set of Obstetrical Instruments	66.00	1529	97	Bow Saw, 2 Blades	8.50
	471	Set of Uterine Instruments	46.00	4152	688	Brace for Posterior Curvature	35.00
3222	443	Sims' Speculum	10.00	1365	83	Bullet Forceps	2.25
3325	443	Speculum	10.00	1357	83	Bullet Forceps, Flexible	6.00
2806	328	Supporter	8.00	1355	82	Bullet Probe	.75
3448	487	Supporter, Cedar Pad	2.50	1526	97	Capital Saw	5.00
3412	478	Tampon Expeller	1.50	1617	107	Circular Saw	12.00
3173	431	Telescopic Speculum	5.00	4256	735	Club-foot (Talipes) Shoe, each, 10.00, 12.00 and 14.00	2.00
3269	449	Tissue Forceps	4.50	1438	89	Direct Pressure Tourniquet	2.00
1721	127	Trocar, Ovarian	20.00	3044	389	Double Current, Soft Rubber Catheter	2.50
3176	431	Tubular Speculum	3.00	1628	109	Drill Stock	7.00
3580	501	Uterine Dilator	5.00	2057	192	Ear Forceps, Foreign Body	2.25
3610	505	Uterine Double Scissors	6.00	2065	193	Ear Forceps, Universal	5.00
3362	473	Uterine Probe, Elastic	1.25	2058	192	Ear Forceps, with Reflector	4.50
3354	473	Uterine Probe, Hard Rubber	1.25	3674	515	Ecraseur, Long Chain	20.00
3360	473	Uterine Probe, Whalebone	.50			Ecraseur, Small Chain	12.00
4400	769	Vaginal Wound Clamp	6.00			Ecraseur, Small Chain, Straight	10.00
1356	88	Thomassin's Bullet Forceps	2.50	2882	346	Eldridge's Pathfinder	3.50
2875	345	Thompson's Bougie, Leadened Stilet	1.00	1168	31	Electrodes, per set	12.00
	394	Digital Exploration of the Bladder		3791	548	Embryotomy Forceps	3.00
2944	358	Divulsor	10.00	1767	145	Entropium Forceps	7.00
3672	515	Ecraseur	25.00	1763	145	Entropium Forceps	7.00
3101	408	Evacuator	15.00	1078	12	Exploring Trocar	2.50
3104	411	Evacuator, modified by Weiss	30.00	2783	323	Finger Pad Truss	5.00
3081	403	Lithotrite	35.00	1306	77	Flexible Joint Catheter	4.00
3073	400	Measure	12.00	2504	269	Flexible Throat Forceps	4.50
1755	143	Optometer	2.00	3931	591	Forearm Splint	4.50
3050	398	Prostatic Sound	5.00	2624	295	Gastro-Mundator	8.50
3050	398	Prostatic Tube	3.00	2735	311	Hæmorrhoidal Clamp	6.00
2897	348	Retention Catheter	3.00	1319	79	Hollow Needle	4.00
3068	400	Searcher	4.00	2619	294	Hollow Piston Stomach Pump	10.00
3072	400	Searcher	4.00	1706	125	Hypodermic Spring Bottle	.80
3059	399	Urethral Forceps	2.00	3572	500	Intra-Uterine Speculum	4.50
3051	394	Urethral Knife	1.75	3585	501	Intra-Uterine Speculum	7.00
				3973	605	Knee Cap, Patella	5.50
				2505	269	Laryngeal Scoop	6.00
				1659	116	Leech, Artificial	7.00
				2618	298	Lever Stomach Pump	16.00

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
3674	515	Tiemann & Co.'s Long Chain Ecraseur.....	\$20.00	1392	84	Tissue Separator, Post's.....	\$1.50
65		Minor Operating Set	25.00	2487	267	Tobold's Concealed Laryngeal Lancet.....	4.00
2488	267	Movable Point Scissors.....	8.50	2437	257	Large Laryngoscope	24.00
3304	454	Needle Forceps for Hagedorn's and other Needles.....	6.00			Student's Lamp.....	6.00
4389	767	Needle Forceps for Hagedorn's and other Needles, Latest	6.00	2490	268	Laryngeal Knife.....	1.50
2016	292	Esophageal Forceps.....	5.00	2491	268	Laryngeal Knife.....	1.50
3973	605	Patella Support.....	5.50	2492	268	Laryngeal Knife.....	1.50
1015	4	Patent Bent Thermometer	3.50	2472	265	Laryngeal Syringe.....	2.50
		Patent Bent Thermometer, with Hick's Lens Front.....	4.00	2564	281	Pneumatic Apparatus.....	
2624	295	Patent Gastro-Mundator	8.50	2489	267	Polypus Scissors, Vocal Cord.....	6.00
4389	767	Patent Needle Forceps.....	6.00	3476	489	Todd's Pessary	3.00
4389	767	Patent Needle Forceps, Aseptic.....	7.00			Toes, Luxation of, see Luxation Forceps.	
1274	70	Patent Pocket Set "A".....	38.00	4284	745	Overriding Apparatus, No. 1, ea. 6.00 to 12.00	
1276	71	Patent Pocket Set "B".....	28.00	4285	745	Overriding Apparatus, No. 2, ea. 7.00 to 15.00	
		Patent Pocket Set "B," Small	20.00			Tongue Depressors:	
3031a	386	Patent Velvet Eye Catheter.....	.75	2381	238	Bosworth's.....	1.25
3031b	386	Patent Velvet Eye Catheter.....	.75	2388	239	Church's.....	6.50
3031c	386	Patent Velvet Eye Catheter.....	1.00			Cohen's.....	1.50
3031d	386	Patent Velvet Eye Catheter.....	1.50	2386	239	Elsberg's.....	4.50
3031e	386	Patent Velvet Eye Catheter.....	.75	2384	238	Folding.....	1.25
3031f	386	Patent Velvet Eye Catheter.....	1.00	2379	238	Goodwillie's.....	2.50
3031g	386	Patent Velvet Eye Catheter.....	1.00	2378	238	Green's Folding.....	2.25
3031h	386	Patent Velvet Eye Catheter.....	.75	2382	238	Hard Rubber	1.50
3031i	386	Patent Velvet Eye Catheter.....	.75			Leale's	.75
3044	389	Patent Velvet Eye Catheter, Double Current	2.50	2385	239	Pocket.....	.75
2665	303	Patent Velvet Eye Rectal Feeding Tube.....	1.50	2377	238	Rumbold's, with 3 Blades.....	6.00
2621	294	Patent Velvet Eye Stomach Tube.....	1.50	2380	238	Sass'.....	3.50
2621	294	Patent Velvet Eye Stomach Tube, Long.....	2.00	2383	238	Steel, Folding.....	2.50
2882	346	Pathfinder.....	3.50	2387	239	Türk's, 3 Blades.....	4.50
1707	125	Pocket Case Hypodermic Syringe.....	2.50	2390	239	Tongue Holding Forceps, Cusco's.....	4.50
3192	437	Quatrivalve Speculum	10.00	2389	239	Dobell's.....	4.50
2665	303	Rectal Feeding Tube, Velvet Eye	1.50	1194	34	Tongue Plate Electrode	1.00
1650	115	Scarificator.....	7.00	1344	81	Tongue-Tie and Director	.50
4176	697	Scoliosis Brace.....	35.00	2397	243	Tonsil Bistoury, Green's.....	2.00
4177	697	Scoliosis Brace, Extra Light and Fine.....	40.00	1193	34	Electrode	1.00
1082	12	Section Knife.....	8.00	2398	243	Forceps, Durham's.....	4.50
3188	435	Speculum Vaginae, Trivalve.....	12.00	2399	243	Forceps, Langenbeck's.....	2.50
4152	688	Spine Brace, Posterior.....	35.00	2394	243	Forceps, Musseux's.....	2.50
1647	115	Spring Lancet.....	2.50	2396	243	Forceps, Tenaculum.....	2.50
2581	284	Steam Atomizer.....	5.00	2407	245	Hæmostatic, Clendinen's.....	2.25
4027	627	Sterling Silver Male and Female Cath- eter	4.00	2400	243	Hook, Green's.....	1.75
2618	293	Stomach Pump, Lever.....	16.00	2395	243	Hook, Green's Double	2.50
2621	294	Stomach Tube, Velvet Eye	1.50 and 2.00	2392	242	Knife, Yearsley's.....	2.25
4256	735	Talipes Shoe, Large, each	14.00		241	Scarification of.....	
4256	735	Talipes Shoe, Medium, each	12.00	2391	242	Buck's Throat Lancet.....	2.50
4256	735	Talipes Shoe, Small, each	10.00	2393	243	Scissors.....	4.50
2404	244	Tonsilotome	15.00	240		Tonsillar.....	
1438	89	Tourniquet	2.00			Tonsilotomes:	
2527	276	Tracheal Aspirator.....	2.50	2403	244	Billing's.....	12.00
2528	276	Tracheal Forceps.....	4.50			Charrière's.....	15.00
2530	277	Tracheotomy and Dilator	3.50	2401	244	Elsberg's.....	10.00
2632	298	Trivalve Speculum Ani.....	12.00			Fahnstock's.....	8.00
3188	435	Trivalve Speculum Vaginae.....	12.00	2405	245	Hamilton's.....	15.00
1279	75	Universal Douche.....	6.00	2406	245	Mackenzie's.....	9.00
2065	193	Universal Ear Forceps.....	5.00	2402	244	Mathieu's.....	12.00
2412	246	Universal Forceps.....	2.50			Sajou's.....	12.00
2601	288	Universal Syringe.....	10.00			Schweig's.....	10.00
3572	500	Uterine Speculum	4.50	2404	244	Tiemann & Co.'s.....	15.00
3585	501	Uterine Speculum	7.00			Tooth Elevators, see Dental Root Elevators.	
3447	486	Uterine Supporter.....	5.00			Forceps, see Dental Forceps.	
1673	120	Vaccinating Scarificator	5.00	1446	91	Torsion Forceps.....	2.50
1672	120	Vaccinating Trocar.....	2.50	1455	91	Esmarch's	2.50
1082	12	Valentine's Knife.....	8.00	1457	91	Hewson's.....	8.00
		Velvet Eye Catheters, &c., see Tie- mann & Co.'s Patent Velvet Eye Catheter, &c.		1450	91	Wheeler's.....	7.00
4257	735	Weak Ankle Brace, each	8.00 to 10.00	700		Torticollis, see also Spinal Braces for Tor- ticollis.	
1540	98	Tirefond	2.00	2623	293	Toswill's Stomach Pump	2.50
3269	449	Tissue Forceps, Thomas'.....	4.50			Tourniquets:	
				1431	88	Charrière's.....	2.50
				1441	90	Emmet's Uterine	5.50
				1440	90	Esmarch's	3.50
				1432	89	Esmarch's, Clamp	.75
				1429	88	Field, Prussian.....	.75
				1429	88	Field, U. S. Army.....	1.00

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Tourniquets :				Transplantation, see Skin Grafting.	
1437	89	Gross'	\$12.00	4403	769	Punch, Carnalt's	\$6.00
1434	89	Langenbeck's Bandage Clamp	1.50	1073	12	Scissors	10.00
1765	145	Laurence's Eyelid	3.00	3467	489	Trask's Pessary	.75
1425	88	May's	15.00	3469	489	Pessary	1.50
1436	89	Mott's	2.00	2960	362	Trelat's Urethrotome	16.00
1430	88	Petit's	2.00	2633	298	Trellis Speculum Ani	16.00
1439	89	Spohn's Rubber Ring, Set of 7	3.50	4041	630	Tremaine's Antiseptic Surgery Case	175.00
1438	89	Tiemann's Direct Pressure	2.00	4043			
2023	187	Toynbee's Artificial Tympanum	.80	2559	279	Trendelenburg's Trachea Tampon	12.00
2015	185	Diagnostic Tube	.75	1541	98	Trepan	2.50
2002	183	Ear Specula, Plated, Set of 3	2.50	98	Trepanning :		
2002	183	Ear Specula, Silver, Set of 3	4.50	1531	98	Brace Trepine and Guarded Crown ..	21.00
2017	185	Explorer	.75	1544	98	Elevator, Plain	1.00
902		Set of Ear Instruments	23.20	1545	98	Elevator and Lenticular Knife	1.75
		Trachea Canula or Tubes :		1547	98	Elevator and Raspatory	1.25
4324	756	Cohen's	8.00	1537	98	Forceps, Van Buren's	2.50
2560	278	Double, Movable Plate, Silver	6.00	1541	98	Hand Trepan	2.50
2547	278	Double, Plain, Silver	5.00	1539	98	Hey's Saw	1.75
		Durham's	12.00	1543	98	Hey's Saw	1.50
2549	278	Elsberg's, with Valve	8.00	1546	98	Lenticular Knife	1.50
2551	278	Gendron's Split, Silver	8.00	1545	98	Lenticular Knife and Elevator	1.75
4323	756	Gerster's Tampon Canula	18.00			Macewen's Elevator	1.50
2554	278	Hard Rubber	2.50			Macewen's Skull Saws and Rasps, per set	7.50
2556	279	Johnson's Double, with Obdurator ..	10.00	1535	98	Raspatory	1.75
2558	279	Keene's	6.50	1542	98	Raspatory, U. S. A.	2.50
2552	278	Little's Aluminium	6.00	1538	98	Scalpel	1.50
4338	757	Park's Aluminium	6.00		72	Set of Instruments, in Case	16.00
2553	278	Silver	4.00	1540	98	Tirefond	2.00
2559	279	Trendelenburg's Tampon Canula	12.00	1532	98	Trepine, Crown and Handle	4.00
2526	276	Tube Mop	.15	1534			
2527	276	Tracheal Aspirator, Tiemann's	2.50	1533	98	Galt's and Handle	4.50
2548	278	Dilator, Chassaignac's	3.00	1534			
2545	278	Dilator, Delaborde's	5.00	1531	98	Guarded, with Brace	21.00
2546	278	Dilator, Trousseau's	2.50	98	Guarded, with Handle		6.00
2528	276	Foreign Body Forceps, Tiemann's	4.50	1753	143	Trial Set, Nacet's	
2525	276	Foreign Body Forceps, Trousseau's ..	2.50	1281	75	Triangular Pus Basin, Hard Rubber ..	3.00
2555	279	Retractor, Minor's	4.50	1772	146	Trichiasis Forceps, Ratti's	3.00
2537	277	Retractor, Pilcher's	2.50	1124	16	Tripod, Post Mortem Head Rest	3.00
2534	277	Retractor, Rose's	1.00	4140	682	Sayre's	10.00
2532	277	Retractor, Well's	2.00	2632	298	Trivalve Speculum Ani	12.00
2536	277	Scissors, Tardieu's	5.00	3186	435	Speculum Vaginae, Meadow's	10.00
2557	279	Tampon, Gerster's	18.00	2633	298	Trellis Speculum Ani	16.00
4323	756	Tampon, Gerster's	18.00			Trocar, Abdominal, see Ovariotomy Trocar.	
		Tampon, Lange's	12.00	1995	182	Ear	1.50
2559	279	Tampon, Trendelenburg's	12.00	1079	12	Exploring	1.50
		Trachelorrhaphy, see Hystero-Trachelorrhaphy.		1075	12	Duchenne's	2.50
		Trachelotomy, see Hystero-Trachelorrhaphy.		1076	12	Duchenne's	3.50
2544	278	Tracheotome, Hanks'	9.00	1077	12	Noeggerath's	3.50
2542	277	Langenbeck's	4.00	1078	12	Tiemann's	2.50
2543	278	Pilcher's Bronchotome	6.00	1715	126	Trocar and Case	2.50
2538	277	Pitha's	3.50			Hydrocele and Ascites :	
2530	277	Tiemann & Co.'s	3.50	1714	126	Harris'	5.00
277		Tracheotomy.		1716	126	Little's	2.50
2539	277	Blunt Hook	1.50	1718	126	Set of 3	4.50
2541	277	Double Hook, Langenbeck's	3.00	1710	126	Set of 4	6.00
2533	277	Guide, Buck's	2.00	1719	126	Trocar and Canula	1.50
2531	277	Scalpel, Probe Point	1.50	1717	126	Warren's	6.00
2535	277	Scalpel, Sharp Point	1.50	1714	126	Wood's	5.00
		Tube, see Trachea Canula or Tube.				Ovariotomy, see Ovariotomy Trocar.	
2516	273	Tube and Laryngeal Dilator, McSher-				Paracentesis Vesicae.	
2517		ry's	16.00	1730	128	Buck's Rectum Trocar	3.50
		Tractor, see Retractor.		3049	392	Cock's Rectum Trocar	15.00
	117	Transfusion.		3012	381	Fitch's Dome Trocar Catheter	6.00
		Transfusion Apparatus :		3048	391	Harrison's Trocar	11.00
1662	117	Aveling's	4.50	1029	128	Parker's Guarded Rectum Trocar ..	4.50
		Aveling's, with Scalpel and Forceps, in Case	8.00	3050	393	Thompson's Sound and Tube	8.00
		Colin's	17.00	1731	128	Van Buren's Double Silver Tube ..	4.00
1663	118	Fryer's	6.50			Thoracic :	
1664	118	Garrigue's	4.00	1711	126	Flint's Trocar and Aspirator	5.00
1665	119	Hutchison's	25.00	1713	126	Robert's Pericardial	3.50
						See also Aspirators.	

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
1797	183	Troeltsch's Ear Mirror	\$3.00	2300	229	Turn-Key, Rotating Fulcrum	\$2.50
2746	312	Trousseau's Pile Supporter	2.75	2297	228	Spring Bolt	3.00
2546	278	Trachea Dilator	2.50	2298	228	Spring Bolt	3.00
2525	276	Trachea Forceps	2.50	1018	4	Twisted Stem Thermometer	2.00
		Troutmann's Spoon for Pharynx	2.50			Twisting Forceps:	
4219	716	Trueheart's Genu Valgum Brace	35.00 to 40.00	3315	456	Emmet's	3.00
3755	539	Obstetrical Forceps	12.00	3316	456	Fitch's	4.50
3811	550	Trephine Perforator	8.00	3314	456	Nott's	3.00
		Trumpet, see Ear Trumpet.		3278	451	Sims'	3.00
		Truss (for Retention of Hernia):				See also Wire Twisters.	
2788	325	Ball and Socket, Double	6.00 to 8.00	66		Two-fold Pocket Set	10.00
2777	322	Ball and Socket, Single	3.00 to 5.00	66		Pocket Set	12.00
2795	327	Bow Spring, Umbilical	5.00	2023	187	Tympanum, Artificial, Toynbee's	.30
2798	327	Bow Spring, Umbilical, Child-				Tympanum Perforators:	
		ren's	2.50 to 3.00	2103	196	Buck's Myringotome	1.00
2773	323	Bow Truss	3.50	2096	196	Gruber's Tensor Tympani Instrument,	2.50
		Chase's, Double	6.00 to 8.00	2099	196	Politzer's Angular Myringotome	1.00
2784	324	Chase's, Single	4.00	2106	196	Politzer's Straight Myringotome	1.00
2794	327	Chase's Umbilical	4.00	2104	196	Prout's Myringotome	1.00
2798	327	Children's Bow Spring	2.50 to 3.00	2095	196	Weber's Tensor Tympani Instrument,	8.00
2797	327	Children's Umbilical	2.50 to 3.00	2571	282	Tyndale's Antiseptic Oro-Nasal Respirator,	3.50
		Elastic, Double	5.00	1704	124	Intra-Pulmonary Syringe	5.50
		Elastic, Single	3.50	1921	163	Tyrrell's Iris Hook, Blunt	1.25
2800	327	Elastic Umbilical	2.50 to 3.50	1922	163	Iris Hook, Sharp	1.25
		Finger Pad, Tiemann's, Double	10.00				
2783	323	Finger Pad, Tiemann's, Single	5.00	2909	350	Ultzmann's Deep Urethral Syringe	4.00
2786	324	Folsom's	20.00	2799	327	Umbilical Bandage	6.00 to 8.00
2789	325	French, Double	6.00	2795	327	Truss, Bow	5.00
2774	322	French, Single	4.00 to 5.00	2798	327	Truss, Bow, Children's	2.50 to 3.00
2790	325	French, Adjustable, Double	8.00	2794	327	Truss, Chase's	4.00
2775	322	French, Adjustable, Single	4.50	2797	327	Truss, Children's	2.50 to 3.00
		German, Double	4.50	2800	327	Truss, Elastic, with Celluloid or Horn	
2776	322	German, Single	3.00			Pad	2.50 to 3.50
		Hull's, Double	3.50	2791	326	Truss, Warren's	25.00 to 30.00
2780	323	Hull's, Single	2.00			Una's Bougie	2.00
		Moc Main, Double	14.00	1045	7	Unison Resonator, Holden's	2.50
2781	323	Moc Main, Single	8.00	1279	75	Universal Douche, Tiemann's	6.00
2787	325	Plain, Double	4.50	2412	246	Forceps, Tiemann's	2.50
		Plain, Single	3.00	1179	39	Handle Electrode, per pair	1.50
2779	323	Ratchet, Double	8.00	2262	224	Root Forceps	2.00 and 2.75
2785	324	Ratchet, Single	4.50	2276	226	Root Forceps	2.00 and 2.75
2788	325	Schuppert's Galvanic	15.00 to 20.00	2601	288	Syringe, Tiemann's	10.00
2777	322	Self-adjusting, Double	6.00 to 8.00	2275	226	Tooth Forceps	2.00 and 2.75
2799	327	Self-adjusting, Single	3.00 to 5.00			Un-united Fracture Apparatus, see Pseu-	
2796	327	Umbilical Bandage	6.00 to 8.00			darthrosis.	
2792	326	Walker's Combination	12.00 to 18.00	2085	195	Up de Graff's Ear Basin	1.50
2793	326	Warren's, Double	8.00 to 10.00	234		Staphylorrhaphy Set, in Case	9.00
2791	326	Warren's, Single	5.00 to 7.00	3648	512	Tumor Forceps	12.00
		Warren's Umbilical	25.00 to 30.00	2204	213	Upson's Syringe and Applicator	14.00
		Wood's Horse-shoe Pad, Double	8.50	236		Uraniscoplasty, see also Langenbeck's	
2782	323	Wood's Horse-shoe Pad, Single	5.00			Uraniscoplastic Instruments.	
3330	458	Tucker's Wire Cutter	6.00	1006	3	Urea Tube	2.00
2738	311	Tumor Forceps, Kelsey's	2.50	466		Urethra, Female:	
3654	512	Nelaton's	3.50	469		Douching the.	
3648	512	Up de Graff's	12.00	466		Inspection of the.	
		See also Uterine Tumor and Poly-		469		Stricture of the.	
		pus Forceps.		467		Tumors of the.	
2022	186	Tuning Fork, Politzer's, A or C	1.50	338		Urethra, Male.	
2895	348	Tunnelled Catheter, Gouley's	2.50	343		Inspection of the, see also Endoscopes.	
2939	356	Sound, Gouley's	2.50	338		Urethral:	
2955	361	Urethrotome, Gouley's	5.00			Applicators, see Urethral Syringes and	
2956	361	Urethrotome, Gouley's Improved	12.00			Applicators.	
3560	498	Tupelo Dilators, Sussdorf's, Hollow, per doz.	3.00			Catheters, see Catheters.	
3561	498	Sussdorf's, Solid, per dozen	1.50	1201	34	Electrode	1.25
	216	Turbinated Bones.		398		Foreign Body Extractors:	
		See also Nasal Septum, Nasal Turbin-		3061	399	Alligator Forceps, Curved	6.00
		ated Bones.		3060	399	Alligator Forceps, Straight	5.50
2387	239	Turk's Tongue Depressor, 3 Blades	4.50	3064	399	Colin's Foreign Body Instrument,	30.00
1785	146	Turnbull's Ice Bag	2.50	3062	399	Leroy d'Etiolle's Curette	12.00
4322	755	Nasal Speculum	6.00	3058	398	Mathieu's Urethral Lithotrite	15.00
	202	Set of Ear Instruments	68.00	3063	399	Mercier's Duplicator	25.00
3390	476	Turner's Applicator	1.50	3057	398	Nelaton's Instrument	40.00
3963	602	Patella Splint	12.00				
2299	228	Turn-Key, Removable Fulcrum	2.50				

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
Urethral, Foreign Body Extractors :			Urethral: Stricture Exploring, Bougies and Sounds :		
3056	398	Reliquet's Urethral Stone Crusher. \$15.00	2866	345	Bougie Conique à Ventre \$1.50
3059	399	Thompson's Urethral Forceps..... 2.00	2876	345	Bougie, Filiform ..... .50
	343	Inspection, see also Endoscopes.	2867	345	Bougie, Olivaire ..... .50
	339	Scales, see also Guages.	2865	345	Bougie, Olivaire à Ventre 1.50
		Sets of Instruments :	2874	345	Bulbous Bougie..... 1.00
	396	Catheters, Set of Silver 25.00	2881	346	Eldridge's Pathfinder 35.00
	396	Gouley's Compact Stricture Set... 50.00	2937	355	Gouley's Whalebone Bougies, ea... .50
	396	Gouley's Complete Stricture Set...109.00	2878	346	Gouley's Whalebone Guides, ea... .50
	397	U. S. A. Genito-Urethral Set, No. 1, 75.00	2879	346	Hunter's Filamentous Wedge .... .75
	397	U. S. A. Genito-Urethral Set, No. 2, 140.00	2872	345	Knotted Bougie..... 1.25
	396	Van Buren and Keyes' Set, Com- pact..... 76.21	2876	345	Leroy d'Etiolle's Filiform Bougie.. .50
	396	Van Buren and Keyes' Set, Com- plete.....121.55	2864	345	Olivary Whalebone Bougie..... .75
		Sounds, see Sounds.	2873	365	Otis' Bulbous Sound, Set of 33, and Handle..... 17.50
		Specula, see Endoscopes.	2886	347	Otis' Metallic Bougie à Boule, ea... .50
		Staffs, see Lithotomy Staffs.	2893	347	Piffard's Fossal Bougie à Boule .. .50
	345	Stricture.	2875	345	Thompson's Leadén Stiletted Oli- vary Bougie..... 1.00
		Stricture Cutters, see Urethrotomy.	2882	346	Tiemann's-Eldridge's Pathfinder.. 3.50
	353	Stricture Dilators (Gradual Dilatation):	2885	346	Warren's Exploring Sound 2.50
		Bougie, Conical, English, 1 to 12.. .50	2900	349	Stricture Exploring, Catheters :
		Bougie, Conical, English, 13 to 16.. .75	2895	348	Bumstead's Retention Catheter.. 3.50
		Bougie, Conical, French..... .50	2877	345	Gouley's Tunnelled Catheter..... 2.50
		Bougie, Conical, Silk..... 1.00	2897	345	Olivary Gum Elastic Catheter..... .50
2926	353	Bougie, Cylindrical, English, 1 to 12, .25	2898	348	Otis' Dilating Catheter and Syringe, 4.50
2926	353	Bougie, Cylindrical, English, 13 to 16, .50	2899	349	Otis' Retention Catheter..... 3.00
2927	353	Bougie, Cylindrical, French..... .25	2897	348	Thompson's Retention Catheter .. 3.00
		Bougie, Olivary, English, 1 to 12, .50	2894	347	Stricture Exploring, Meatometer, Pif- fard's..... .50
		Bougie, Olivary, English, 13 to 16, .75			Stricture Exploring, Meatotome, see Meatotome.
		Bougie, Olivary, French..... .50			Stricture Exploring, Urethrameter, see Urethrameter.
		Bougie, Olivary, Silk..... 1.00			Syringes and Applicators :
2928	353	Bougie, Olivary, Soft Rubber, .75	2920	351	Bigelow's Catheter Syringe 6.00
2932	354	Burge's Curved Dilator..... 10.00	2908	350	Brown's Syringe and Applicator .. 24.00
2933	354	Burge's Straight Dilator..... 10.00	2917	351	Bryce's Urethral Applicator 5.50
2939	356	Gouley's Tunnelled Sound..... 2.50	2906	350	Bumstead's P. P. Syringe..... .75
2936	355	Minor's Dilators..... 3.50	2910	350	Bumstead's Urethral Syringe..... 2.50
2930	354	Steel Sound, Conical, Curved..... 1.25	2902	350	Buttle's Gonorrhœa Syringe 5.00
2929	353	Steel Sound, Conical, Straight... 1.25	2918	351	Caspar's Ointment Bougie..... 2.00
		Steel Sound, Cylindrical..... 1.00	2914	351	Dick's Caustic Syringe..... 3.50
2851	342	Steel Sound, Gouley's..... 1.25	2905	350	Hard Rubber P. P. Syringe..... 1.50
		Steel Sound, Otis'..... 1.25	2913	351	Harrison's Pessary Catheter..... 4.00
2931	354	Steel Sound, Teft's..... 1.25	2921	352	Harrison's Urethral Irrigator..... 3.50
		Steel Sound, Van Buren's..... 1.25	2911	350	Hutchison's Catheter for Apply- ing Ointments, in Case..... 10.00
4360	763	Steel Sound, Wyeth's, Curved and Straight, each..... 1.25	4368	764	Keyes'-Ultzman's Syringe..... 6.00
2935	355	Weisse's Urethral Sound..... 1.00	4363	763	Kiefer's Nozzle..... 1.50
	357	Stricture Divulsors, Rapid Dilatation and Divulsion :	2912	351	Lallemand's Porte Caustique 4.50
2945	358	Gouley's Divulsor..... 12.00	2907	350	Long Pipe Syringe..... 1.25
2940	356	Gouley's Over-distender..... 12.00	2919	351	Mallez's Powder Insufflator 1.75
2946	358	Gross' Urethral Dilator..... 14.00	2923	352	Mitchell's Reflux Catheter..... .75
2942	357	Holt's Divulsors, per set..... 20.00	2916	351	Ointment Bougie..... 2.00
2943	358	Holt's Divulsors, modified by Bum- stead, per set..... 20.00	2901	349	Otis' Syringe Nozzle..... 1.00
2949	359	Schweig's Dilator..... 10.00	2904	350	Sigismund's P. P. Syringe..... .75
2947	359	Stearns' Dilator..... 5.00	2922	352	Thornton Parker's Tube..... .50
2950	359	Steurer's Dilator..... 8.00	2909	350	Ultzmann's Deep Urethral Sy- ringe..... 4.00
2951	359	Thebeaud's Dilator..... 10.00	2915	351	Van Buren's Cupped Sound 2.00
2944	358	Thompson's Divulsor..... 10.00	2903	350	Wheelock's Reverse Flow Syringe, 2.00
2941	357	Voilemier's Divulsor..... 22.00	2925	352	Winternitz's Psychrophor, Silver, 4.00
	345	Stricture Exploring, Bougies and Sounds :			Winternitz's Psychrophor, Soft Rubber..... 2.50
2880	346	Banks' Whalebone Bougies, ea. .. 1.25		382	Urethral and Uro-Cystic, see also Bladder.
2873	345	Bell's Ball Sound..... 1.25	2883	346	Urethrameter, Gross'..... 20.00
2874	345	Bougie à Boule..... 1.00	2974	366	Otis', Hinged..... 22.00
2869	345	Bougie à Boule, Dick's..... 1.00			Otis', Spring..... 18.00
2870	345	Bougie à Boule, Malez's..... 1.25	4365	764	Otis', Spring, Latest..... 24.00
2886	347	Bougie à Boule, Otis', each..... .50	2884	346	Weir's..... 18.00
2893	347	Bougie à Boule, Piffard's..... .50			Urethrotome, see Urethrotomy, Internal.
2934	355	Bougie à Boule, Weisse's..... 1.00			
2872	345	Bougie à Nœuds..... 1.25			
2871	345	Bougie à Trois Nœuds..... 1.25			
2868	345	Bougie Conique..... .50			

FIG.	PAGE.	PRICE.	FIG.	PAGE.	PRICE.
	360	Urethrotomy:		1	Urinary Examination Apparatus:
	374	External Perineal:	1011e	3	Bunsen Burner \$1.50
	377	Cock's Operation.	1005	3	Fehlich's Flask, with Burner and Bu-
3049	392	Cock's Trocar \$15.00			rette 4.75
	375	Gouley's Method.	1000	1	Flint's Apparatus 70.45
		See also Gouley's External		2	Flint's Extra Apparatus, Prices on p. 2.
		Urethrotomy.	1003	3	Graduated Measure Glass ..... .75
	374	Syme's Operation.	1008	3	Graduated Tube for Approximate An-
2995	374	Syme's Staff 2.00			alysis 1.25
	375	Wheelhouse's Operation.	1001	2	Lewis' Urine Test Apparatus 25.00
2997	375	Teale's Probe Gorget 2.50			Loomis' Apparatus 32.00
2996	375	Wheelhouse's Staff 2.00	1010c	3	Mohr's Beaker ..... .10 to .30
	373	Hæmostatic:	1010a	3	Mohr's Burette 2.50
2991	373	Bates' Urethral Hæmostat 4.00	1010b	3	Mohr's Stand 1.50
2994	374	Hunter's Urethral Tourniquet 5.50			Piffard's Apparatus 83.50
2993	373	Otis' Urethral Hæmostatic Tube ..... .75	1009a	3	Piffard's Measuring Pipette ..... .50
2992	373	Otis' Perineal Tourniquet 5.00	1007		Rapid Filtration Apparatus
	360	Internal (Instruments cutting from	1011a	3	Retort Stand 1.50
		before backward):	1001	2	Roberts' Urine Test Apparatus 25.00
2954	360	Bumstead's-Maisonneuve's Ureth-	1006	3	Urea Tube (Tube only) 2.00
		rotome 14.00	1004	3	Urinometer ..... .50 to 1.25
2955	361	Gouley's Tunnelled Urethrotome, 5.00	1002	2	Vance's Urine Test 6.00
2956	361	Gouley's Tunnelled Urethrotome,	1011b	3	Water Bath 2.50
		Improved 12.00	1011c }		Water Oven 1.50
2961	362	Gross' Urethrotome 6.00	1011d }		
2952	360	Maisonneuve's Urethrotome 14.00			
2963	363	Mastin's-Maisonneuve's Urethro-	384		Urine, Retention of.
		tome 14.00			See also Catheters.
2959	362	Mastin's Stricture Cutter 8.00	1004	3	Urinometer ..... .50 to 1.25
2957	361	Pritchett's Rotating Urethrotome, 25.00	382		Uro-Cystic, see also Bladder.
2958	362	Teevan's Stricture Cutter 12.00	430 }		
2960	362	Trelat's Urethrotome 16.00	466 }		Female Bladder.
2953	360	Voillemier's Urethrotome 16.00	396		Skene's Uro-Cystic and Urethral Set. 63.35
2962	362	Westmoreland's Urethrotome 12.00	1363	83	U. S. A. Bullet Forceps 2.00
4414	770	Whitehead's Urethrotome 15.00	62		Capital Operating Set 102.50
	363	Internal (Instruments for retrograde	1429	88	Field Tourniquet 1.00
		operation):	397		Genito-Urethral Set, No. 1 75.00
2971	364	Banks' Urethrotome 20.00	397		Genito-Urethral Set, No. 2 140.00
2969	363	Bates' Urethrotome 15.00	1273	61	Otis' Compact Field Set 160.00
2967	363	Bumstead's-Peters' Urethrotome. 50.00			Pocket Set, Aseptic 28.00
2965	363	Charrière's Stricture Cutter 14.00	72		Regimental Surgeon's Pocket Set 23.00
2964	363	Civiale's Urethrotome 12.00	62		Staff Surgeon's Capital Operating Set, 137.10
2970	364	Gross' Exploratory Urethrotome. 6.00	62		Staff Surgeon's Minor Operating Set, 136.00
2968	363	Kinloch's Urethrotome 25.00	3844	561	Usual Perineum Needle ..... .75
2978	368	Otis' Bulbous Urethrotome 18.00	473		Uterine:
2966	363	Peters' Urethrotome 6.00			Uterine Applicators:
2960	363	Trelat's Urethrotome 16.00	3401	477	Barker's Ointment Bougie 1.25
	364	Internal Dilating, Urethrotomes:	3398	476	Edward's Caustic Holder 2.50
2989	371	Brown's Urethrametome 27.00	3394	476	Emmet's Applicator 1.50
2972	364	Gouley's Dilating Urethrotome .. 15.00	3388	476	Gardner's Caustic Forceps 3.00
2987	371	Hunter's Divulsor and Urethro-	3389	476	Gardner's Caustic Holder 2.50
		tome 35.00	3404	477	Lawson's Applicator 4.00
2982	370	Milne's Dilating Urethrotome 17.00	3392	476	Lente's Double Bulb Caustic Probe .. 1.75
2986	370	Nall's Urethrotome 40.00			Munde's Applicator ..... .50
2978	368	Otis' Bulbous Urethrotome 18.00			Munde's Ointment Tube 2.00
2975	367	Otis' Dilating Urethrotome, No. 1, 40.00	3408	477	Nott's Applicator 4.50
2976	368	Otis' Dilating Urethrotome, No. 2, 40.00	3391	476	Nunn's Applicator ..... .75
2979	369	Otis' Dilating Urethrotome, No. 3, 30.00	3397	476	Parker's Uterine Applicator, with
2980	369	Otis' Dilating Urethrotome, No. 4, 30.00			Velvet Eyes 1.25
2981	369	Otis' Divulsing Urethrotome 40.00	3387	476	Simpson's Porte Caustic 2.50
2990	372	Rogers' Dilating Urethrotome and	3395	476	Sims' Caustic Forceps 3.50
		Urethrameter 40.00	3390	476	Skene's Instillation Tube ..... .50
2984	370	Smith's Urethrotome 30.00	3385	475	Turner's Applicator 1.50
2983	370	Stearns' Dilating Urethrotome 12.00	3372 }		Wackerhagen's Applicator ..... .10
4370	764	Walker's Urethrotome 35.00	3373 }		Wylie's Cervical Protector and Appli-
		White's Urethrotome 35.00			cator 3.50
2985	370	Wyeth's Urethrotome 35.00	510		Uterine Curettes, Enucleators, Scoops:
2988	371	Young's Dilating Urethrotome 50.00	3644	511	Bozeman's Curette 2.25
	383	Urinals for Incontinence:	3635	511	Emmet's Curette Forceps 3.50
3016	383	India Rubber 2.50	3634	511	Emmet's Enucleator 1.50
3014	383	India Rubber, Male 2.50	3633	510	Hanks' Curette 2.00
3015	383	India Rubber, Male or Female 6.50			Munde's Curette, Blunt 1.50
3013	383	Tiemann's Instrument for Extrophy			Munde's Curette, Sharp 1.50
		of Bladder 35.00 to 100.00	3645	511	Reinstetter's Rinse-Curette 4.00
			3639	511	Richardson's Finger Elongator 6.00

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Uterine Curettes, Enucleators, Scoops :				475 Uterine Dressing, see also Uterine Appli- cators.	
3640	511	Siemon's Curette, Blunt.....	\$2.50			Uterine Dressing Forceps :	
3641	511	Siemon's Curette, Sharp.....	2.50	3384	475	Bozeman's.....	\$2.50
3631	510	Sims' Curette.....	1.75	3376	475	Dressing Forceps.....	3.00
3632	510	Sims' Curette.....	3.00	3378	475	Dressing Forceps.....	2.00
3637	511	Skene's Curette.....	1.75	3379	475	Dressing Forceps.....	2.50
3636	511	Thomas' Curette.....	1.50	3383	475	Dressing Forceps.....	2.00
3630	510	Thomas' Curette.....	1.50			Elliott's.....	2.00
3629	510	Thomas' Curette, 3 with 1 Handle.....	4.50	3381	475	Jones'.....	6.00
3643	511	Thomas' Serrated Scoop.....	3.50	3380	475	Newman's Metrorrhagon.....	3.00
3642	511	Three Curettes, each.....	1.75	3377	475	Nunn's Folding Forceps.....	6.00
3638	511	Yarrow's Enucleator.....	4.50	3382	475	Nunn's Forceps and Scissors Com- bined.....	5.00
		See also Curette, Uterine.				478 Uterine Dressing, Vaginal Tamponade :	
		473 Uterine Diagnosis, see also Uterine Appli- cator, Uterine Tumor and Polypus For- ceps, Uterine Probe, Uterine Sound.		3410	478	Barnes' Tampon Speculum.....	2.00
		498 Uterine Dilators :		3411	478	Braun's Tampon Expeller.....	2.50
3578	501	Ady's.....	14.00	3412	478	Thomas' Tampon Expeller.....	1.50
3586	501	Atlee's.....	2.75			Uterine Electrodes :	
3575	500	Ball's, Modified.....	10.00	1228	36	Cup and Stem.....	2.50
3574	500	Ball's, Original.....	10.00	1197	34	Cup-Shaped, 3 sizes, each.....	2.00
3576	500	Ball's Stem Pessary.....	1.50	1200	34	Elastic.....	3.00
3577	500	Ball's Stem Pessary.....	1.50	1201	34	Insulated.....	1.25
		Barnes', each.....	1.00	1199	34	Spiral.....	1.25
		Barnes', with Stopcock, each.....	1.50			Uterine Elevators, see Uterine Repositors.	
3605	504	Barnes' Set of 3, with Syringe and Stopcocks.....	6.00			Uterine Enucleator, see Uterine Curette.	
		3566 498 Campbell's Intra-Uterine Stem, per set.....				Uterine Excision Instruments, see Hyster- ectomy, also Hysterotome.	
			4.50	3555	497	Uterine Fixator, Byrne's.....	2.50
3601	504	Climax.....	15.00			See also Uterine Tenaculum.	
3607	501	Cowan's, per set.....	2.50			Uterine Forceps, see Uterine Tumor and Polypus Forceps.	
3589	502	Ellinger's.....	10.00	3359	473	Uterine Instruments, Nott's, per set.....	10.00
3595	503	Ellinger's.....	10.00			479 Uterine Irrigation, Douching :	
3573	500	Elliott's Intra-Uterine Speculum.....	7.00	3423	482	Bozeman's Intra-Uterine Back-flow Tube.....	3.00
3600	504	Emmet's Sponge Dilator.....	2.50	3419	482	Byrne's Reflux Catheter and Adjuster.....	2.50
3603	504	Emmet's Water Dilator.....	2.00	3414	480	Foster's Intra-Vaginal Syringe.....	4.00
4345	759	Fritsch's Uterine Dilators, each.....	1.50	3415	481	Fraser's Intra-Vaginal Syringe.....	3.00
3596	503	Goodell's, Large.....	10.00	3416	481	Frost's Vaginal Douche.....	2.50
3595	503	Goodell's, Small.....	10.00	3424	482	Hanks' Intra-Uterine Douche Tube.....	1.50
3570	499	Hanks', per set.....	5.00	3413	479	Hospital Bed Pan.....	4.00
3571	499	Hanks' Rapid Uterine Dilators, Set of 10.....	5.50	3421	482	Nott's Double Current Catheter.....	3.00
		Hegar's, Set of 25.....	14.00	3422	482	Nott's Double Current Catheter.....	2.50
3592	502	Howard's.....	9.00	3420	482	Reliquet's Double Current Catheter.....	3.50
3582	501	Hunter's.....	14.00	3417	481	Thornton Parker's Vaginal Syringe.....	3.00
		Kaemmerer's, Set of 4.....	6.00	3418	482	Woodward's Uterine Syphon Douche.....	2.50
3588	502	Long's Dilator and Injector.....	10.00			Uterine Knives :	
		McGillcuddy's.....	6.50	3294	452	Bozeman's.....	1.75
3606	504	McLean's-Barnes' Bag.....	2.50	3284	452	Bozeman's, Angular, Right and Left, each.....	1.75
3597	503	McLean's Introducer.....	4.50			Bozeman's, Delicate.....	1.75
3590	502	Miller's.....	10.00			Bozeman's, Straight.....	1.75
3591	502	Nelson's.....	5.50			Emmet's, Ball and Socket.....	5.00
3581	501	Nott's.....	3.50			Emmet's, Ball and Socket, Improved.....	7.00
3602	504	Ohr's Dilator and Corrector.....	7.50			Jenks'.....	2.00
3594	503	Palmer's.....	5.00	3624	503	Knife.....	1.50
3598	503	Palmer's Latest, 2 sizes, each.....	5.00	3617	506	Leuneker's, Right and Left, each.....	2.00
3569	499	Peaslee's, Set of 5.....	6.50	3290	452	Nott's.....	1.50
3579	501	Simpson's.....	4.50	3291	452	Nott's, Angular.....	1.50
3568	499	Simpson's, Set of 12, in Case.....	7.50	3616	506	Probe Pointed.....	1.50
		Sims', 2 Bladed.....	6.00	3289	452	Scalpel, Right and Left, each.....	1.75
3587	502	Sims', 3 Bladed.....	12.00	3292	452	Scott's.....	1.50
3560	498	Sussdorf's Tupelo, Hollow, per doz.....	3.00	3287	452	Sims' Holder and 4 Knives.....	10.00
3561	498	Sussdorf's Tupelo, Solid, per doz.....	1.50	3293	452	Sims' Probe Pointed.....	1.50
		Tent, see Tents.		3282	452	Sims' Rotating.....	4.50
3580	501	Thomas'.....	5.00	3288	452	Sims' Scalpel.....	1.50
3572	500	Tiemann's Intra-Uterine Speculum.....	4.50			See also Hysterotome, Metrotome, Uterotome.	
3585	501	Tiemann's Intra-Uterine Speculum.....	7.00	3620	506	Uterine Leech, Reese's.....	4.50
3593	502	Vanderveer's.....	5.50			Uterine, Malignant Disease, see Hysterec- tomy.	
3562	498	Wallace's Spring Tent, each.....	1.50			483 Uterine Malpositions, Displacements. See also Pessary, Uterine Repositors.	
		Wathen's, 2 sizes, each.....	8.00				
3583	501	Wessinger's.....	4.50				
3584	501	White's.....	4.50				
		Wilson's.....	9.00				
3599	503	Wylie's.....	6.00				

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Uterine Needles:				Uterine Scissors:	
		Bozeman's, per dozen	\$1.50			Jenks'	\$4.50
		Cole's, per dozen	1.50	3678	516	Kuechenmeister's	6.00
		Dawson's, per dozen	1.50			Serrated, Curved	5.50
		Dickinson's, per dozen	1.50			Serrated, Straight	5.00
1320	79	Emmet's, Round Pointed, per dozen	1.50	3295	453	Sims', Curved	4.50
		Emmet's, Triangular Pointed, per doz.	1.50	3281	452	Sims', Curved, Sharp Points	4.50
		Goodell's, per dozen	1.50	3296	453	Sims', Straight	3.50
3310	455	Hagedorn's, per dozen	1.50	3826	556	Skene's, Hawk-bill	10.00
		Lyman's, per dozen	1.50			Skene's, Wire	5.00
		Martin's, each	.25	3610	505	Thomas', Double	6.00
		Schnetter's, per dozen	1.50	3830	557	Uterine Sector, Skene's	11.00
		Simon's, per dozen	1.50			Uterine Sets of Instruments, in Cases:	
1320	79	Sims', Round Pointed, per dozen	1.50	3352	471	Buttles'	23.00
		Sims', Triangular Pointed, per dozen	1.50			Elliott's	25.00
4356	760	Skene's, per dozen	1.50	3351	470	Gardner's	46.00
		Wathen's, per dozen	1.50	3353	471	Hunter's Gynecological Bag	
		Wylie's, per dozen	1.50			Munde's	16.00
	506	Uterine Plethora:				Nott's	111.46
3619	506	Thomas' Dry Copper	1.50			Peaslee's	60.00
		See also Uterine Leech, Uterine Scarificators.				Sims'	125.00
		Uterine Polypus, see Uterine Tumors and Polypi.				Skene's	54.25
		Uterine Powder Blower, Kelly's				Thomas'	46.00
		Uterine Probes:				Wylie's Office or Polyclinic Set	45.00
		Chapman's, per set	4.00			Wylie's Bellevue Hospital Clinic Set	100.00
3357	473	Jenks'	1.75			Uterine Sounds:	
3361	473	Lead	.40	3357	473	Chapman's, per set	4.00
3355	473	Silver	1.25	3369	474	Fitch's	2.00
3356	473	Silver	1.25	3367	474	Folding	2.50
3363	473	Thomas', Elastic	1.25	3375	474	Gidding's	2.00
3362	473	Thomas', Hard Rubber	1.25	3365	474	Hunter's	1.25
3354	473	Thomas', Whalebone	.50	3371	474	Jenks'	3.50
3360	473	Wyeth's	1.00			Kammerer's, Set of 4	6.00
3358	473	See also Uterine Sound.		3370	474	Leonard's	5.50
	483	Uterine Repositors, Redressors:		3368	474	Leonard's Uterometric	3.25
3435	484	Blake White's Metratrep	14.00			Simpson's	1.25
3460	488	Campbell's Pneumatic Repositor	.25	3364	474	Simpson's, Graduated	1.50
3437	485	Carroll's Repositor	3.50			Sims'	1.25
3431	483	Elliott's Sound	7.00	3374	474	Skene's	3.50
3427	483	Emmet's Elevator	4.50	3366	474	Sliding	3.00
3429	483	Gardner's Manifold Instrument, Complete	12.00			Uterine Speculums:	
3428	483	Guernsey's Elevator	1.50	3573	500	Elliott's	7.00
3436	485	Leonard's Repositor	11.00	3572	500	Tiemann's	4.50
3433	488	Noeggerath's Elevator	9.00	3585	501	Tiemann's	7.00
3434	484	Porter's Repositor	6.00	3372	474	Wylie's Cervical and Applicator	3.50
3425	483	Sims' Elevator, No. 1	6.00			Uterine Stenosis, see also Hysterotomes.	
3426	483	Sims' Redressor, No. 2	6.00			Uterine Supporters:	
3432	483	Skene's Elevator and Curette	10.00	3456	487	Donaldson's	2.50
3430	483	Stowe's Retroversion Elevator	4.50	3450			
3438	485	White's Repositor	5.00		487	McIntosh's, each	5.00
		Uterine Scarificators:		3453			
3623	506	Buttles'	1.25	3448	487	Thomas'	2.50
3614	506	Buttles', and Tenaculum	2.50	3447	486	Tiemann's	5.00
3615	506	Chapman's	1.50			See also Pessaries.	
3621	506	Chapman's	2.50			Uterine Syringes:	
3618	506	Skene's Sound and Scarificator	6.00	3400	477	Braun's	2.50
3622	506	Storer's	6.00			Buttles'	2.00
		See also Uterine Knives.		3405	477	Dick's Caustic	3.50
		Uterine Scissors:		3402	477	Hutchison's Ointment, with 1 Hard Rubber Tube	3.00
3680	516	Amputating Cervix	6.00			Hutchison's Ointment, with 3 Silver Tubes	10.00
3611	505	Bozeman's	4.50	3396	476	Kelly's, Silver	5.00
3286	452	Bozeman's, Curved	4.50	3403	477	Lente's, Ointment	4.50
3285	452	Bozeman's, Double Curved	4.50	3407	477	Lente's, Ointment	8.00
3679	516	Clark's Tooth Edged	9.00			Long Pipe	1.25
		Dawson's	5.00			Munde's	2.00
		Emmet's (Bladder)	4.50	3409	477	Nott's, Hard Rubber	2.50
3299	453	Emmet's, Double Curve	4.50	4371	764	Woodward's, for Nitrate of Silver	4.00
3297	453	Emmet's, Knee-bent	4.50			Uterine Tenaculums:	
3298	453	Emmet's, Slightly Curved	4.50	3263	449	Bozeman's	1.50
4410	770	Hanks'	5.00	3266	449	Bozeman's, Long	1.50
3301	453	Heywood Smith's	12.00	3262	449	Double	1.75

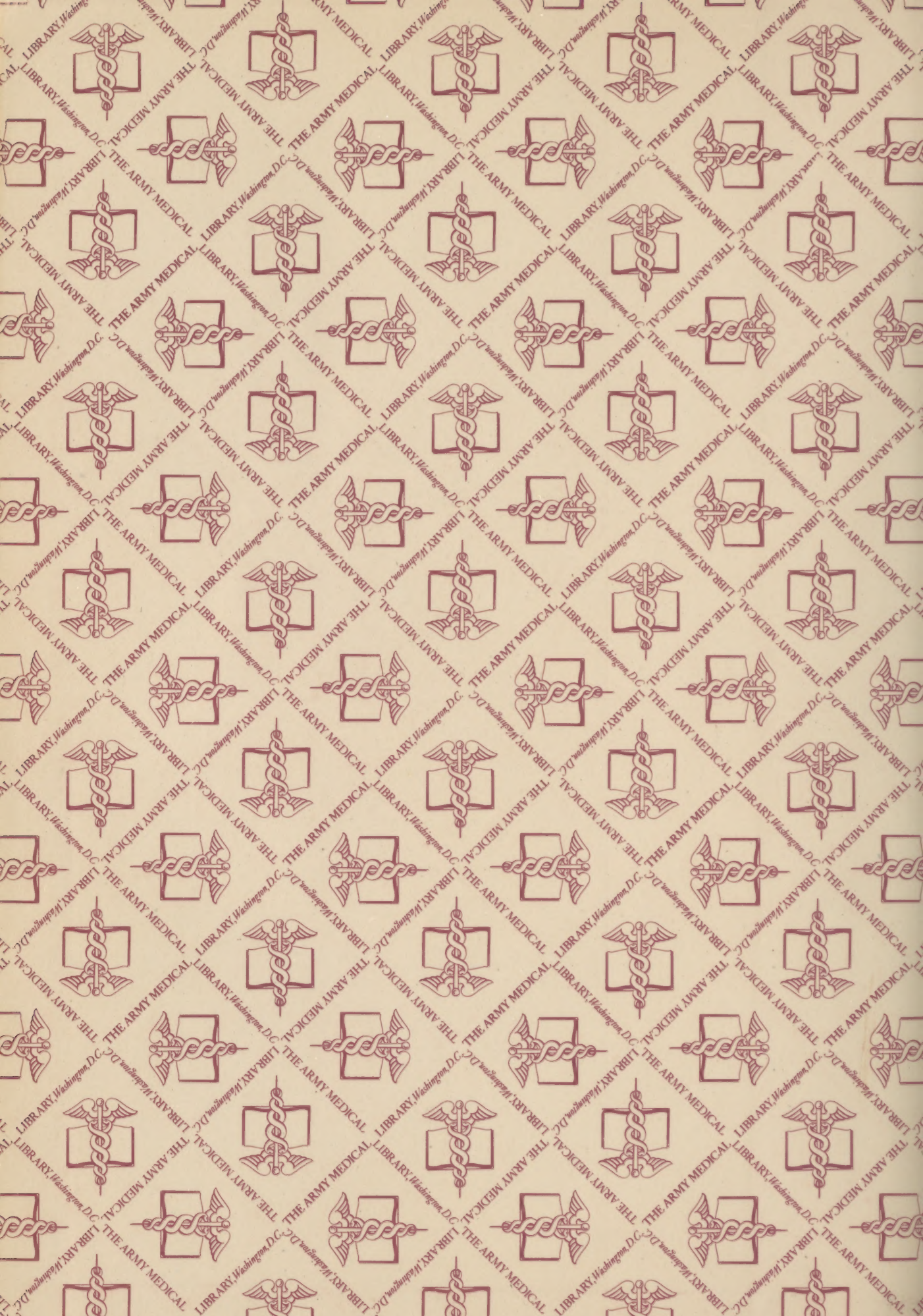
FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Uterine Tenaculums:				Vaccinator, Teller's	\$2.50
3257	449	Emmet's	1.25			Vaccine Virus, Martin's, per package of 10 points	1.00
3258	449	Emmet's	1.25			Vacker's Obstetrical Forceps, Rotating	8.50
3261	449	Emmet's	1.25			Vaginal Depressors:	
3265	449	Emmet's	1.25	3247	448	Bozeman's	2.50
3558	497	Emmet's, Double	5.00	3248	448	Bozeman's, Double Hooked	3.00
3259	449	Emmet's, Heavy	1.50	3253	448	Bozeman's, Urethral and Perineal	2.50
3270	449	Long, Angular	1.50	3235	445	Garrigue's	2.00
3271	449	Long, Stout	1.50	3252	448	Hunter's	1.50
3552	497	Nott's, for Speculum	.25	3234	445	Nott's	1.50
3260	449	Perry's, Barbed	1.50	3249	448	Nott's	1.50
3256	449	Sims'	1.25	3250	448	Sims'	1.50
3264	449	Sims', Long	1.25	3251	448	Sims', Double	1.50
		Uterine Tenaculum Forceps:				Vaginal Dilators:	
3556	497	Byrne's	6.00	3241	446	Bozeman's	1.00
3558	497	Emmet's	5.00	3242	446	Bozeman's	1.00
3553	497	Hanks'	3.00	3441	486	Bozeman's	1.00
3559	497	Sims'	3.50	3213	442	Sims', Glass	.50
3825	556	Skene's	3.00	3213	442	Sims', Hard Rubber	.75
3557	497	Wooster's	2.50			Vaginal Douche, see Vaginal Syringe.	
3554	497	Wylie's	3.00	1222	35	Vaginal Electrode	4.00
		Uterine Tourniquet, Ady's	4.00	1223	35	Electrode	4.00
3676	516	Emmet's	5.50	1190	33	Electrode, Insulated	2.50
	510	Uterine Tumors and Polypi.		1189	33	Electrode, Nickel-plated	1.50
		See Uterine Curettes, also Ecraseurs.			480	Injection, see also Vaginal Syringe.	
		Uterine Tumor and Polypus Forceps:		3335	461	Retractor, Simon's, Plain	3.00
3650	512	Aveling's Polypome	8.00	3334	461	Retractor, Simon's, Serrated	3.50
3655	513	Byrne's Vulsellum	3.00			Vaginal Speculums:	
3656	513	Byrne's Vulsellum	3.00	3175	431	Ashton's, Glass	1.00
3661	513	Campbell's Tumor	8.00	3185	435	Ball's	11.00
3662	513	Cushing's Vulsellum	3.00	3218	442	Barnes-Neugebauer's	2.50
3659	513	Greenhalg's Tumor	6.00	3184	433	Bath	3.00
3657	513	Luer's Polypus	6.00	3215	442	Baxter's	4.00
3660	513	McClintock's Polypus	6.00	3239	446	Blart's	
3647	512	Nelaton's Pedicle	3.50	3177	431	Bivalve	5.00
3654	512	Nelaton's Tumor	3.50	3196	437	Bivalve	5.00
		Sims' Polypus	3.50	3198	439	Bivalve, Steel	5.50
3652	512	Sims' Enucleator	3.50	3183	433	Blakeley's	3.00
3653	512	Sims' Enucleator Blunt Hook	3.50	3197	437	Blake White's-Nott's	5.00
3646	512	Sims' Vulsellum Hook	5.50	3229	444	Blake White's-Sims'	2.50
3648	512	Up de Graff's Tumor	12.00	3226	443	Bozeman's	12.00
3658	513	Wales' Polypus	3.00	3244	447	Bozeman's, Columning, 3 Blades	9.00
3692	525	Wilcox's	5.50	3214	442	Bozeman's, Duck Bill	2.50
		See also Galvano-Cautery and Ligator.		3190	435	Brewer's	4.00
3613	505	Uterotome, Peaslee's, with 1 Blade	4.50	3208	441	Byrne's	11.00
3613	505	Peaslee's, with 2 Blades	6.50	3220	443	Cracour's	6.50
		See also Hysterotome, Metrotome.		3230	444	Darrow's, 2 Blades	12.00
		Uvula Forceps:		3217	442	Dawson's Dilating	7.00
2412	246	Tiemann's	2.50	3237	446	Dawson's-Ehrich's	14.00
2410	246	Vulsellum	3.00	3216	442	Dawson's-Sims'	5.00
		Uvula Hooks:		3204	439	Dickens'	9.00
2175	208	Czermack's	2.50	3172	431	Dome Top	1.50
2174	208	Frankel's	2.50	3182	433	Dowell's	1.50
2169	208	Jarvis' Tape Holder	.75			Ehrich's	13.00
2419	250	Lefferts'	2.00	3236	445	Emmet's	7.00
2452	263	Roe's	1.00	3174	431	Ferguson's Tubular, Glass, Mirror	.50
2454	263	Rumboldt's Retractor	2.00			Ferguson's Tubular, Hard Rubber	1.00
2455	263	Rumboldt's Spreading Retractor	7.50			Ferguson's Tubular, Hard Rubber, with Nickel-plated Metal Mirror	1.50
		Sajou's	3.50	3171	431	Ferguson's Tubular, Metal	1.50
2173	208	Voltolini's	2.50	3181	433	French's	1.50
2408	246	Uvula Scissors	5.50	3231	444	Fryer's	2.00
2409	246	Scissors, with Claws	5.50	3233	445	Fryer's Self-retaining	12.00
2411	246	Uvulatome, Knox's	6.50			Goodell's	7.00
2413	246	Mackenzie's	9.00	3210	441	Graves'	5.00
				3199	439	Hale's	5.00
1666	120	Vaccinating Lancet	.75	3228	444	Hanks'-Ehrich's	13.00
1671	120	Lancet, Weir's	.75	3202	439	Howard's	6.00
1670	120	Lancet and Comb, Weir's	1.00	3201	439	Hunter's	6.00
1673	120	Scarificator, Tiemann's	5.00	3245	447	Hunter's-Ehrich's	9.00
1672	120	Trocar, Tiemann's	2.50	3195	437	Jenks'	8.00
1668	120	Vaccinator, Carroll's	.25	3206	441	Keene's	7.00
1667	120	Dawson's	3.50	3180	433	Labia	2.00

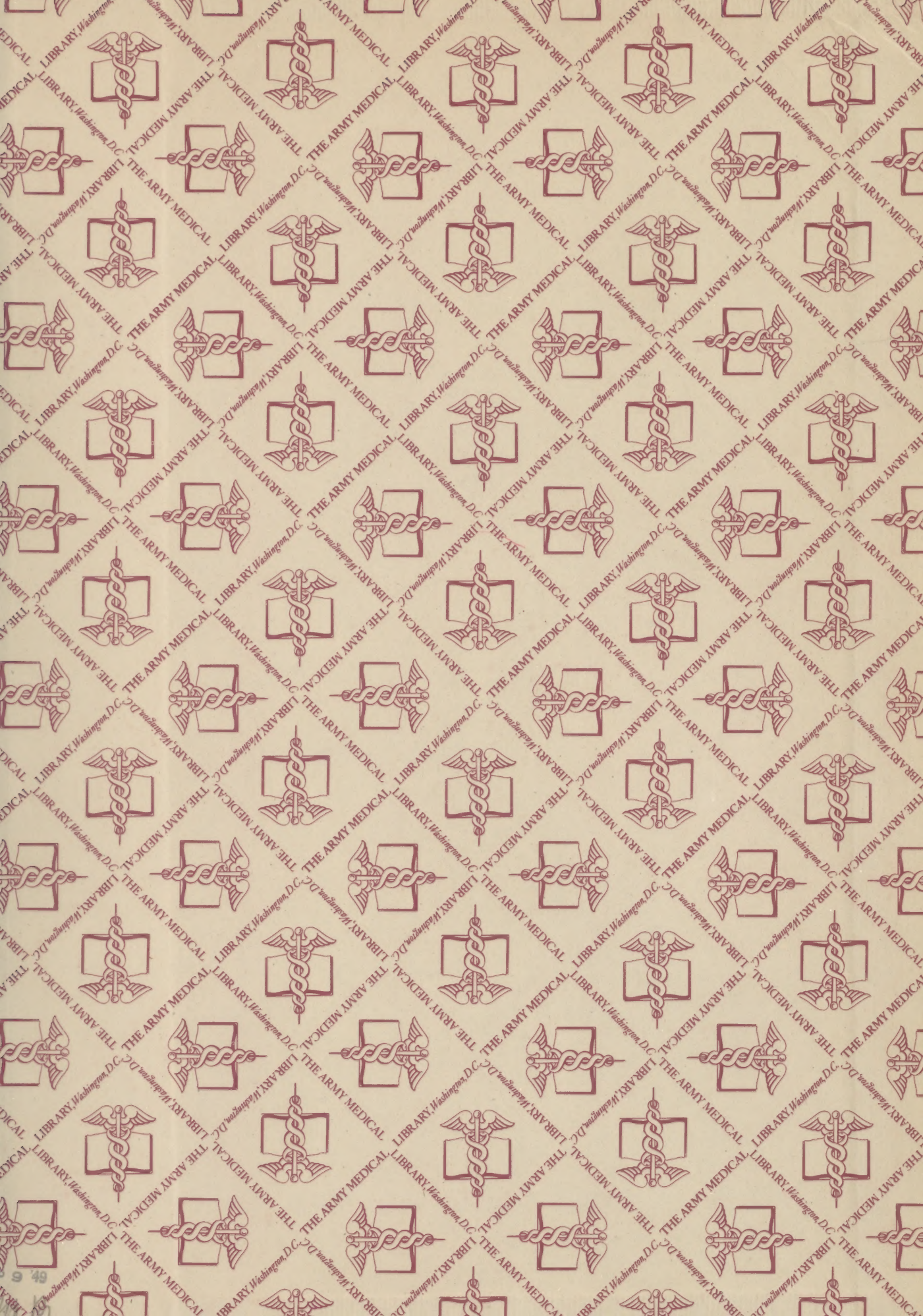
FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
		Vaginal Speculums:					
3200	439	Leonard's.....	\$6.00	2844	340	Van Buren and Keyes' American Scale.....	\$3.50
3194	437	Meadow's Quatrivalve.....	15.00	396		Compact Set of Urethral Instruments.....	76.21
3186	435	Meadow's Trivalve.....	10.00	3017	383	Hot Water Bag.....	5.00
3246	447	Munde's.....	3.50	397		Set of Instruments for Stone.....	134.75
3191	435	Nelson's.....	4.50	396		Set of Urethral Instruments.....	121.55
3211	441	Nott's.....	4.00	1067	10	Vance's Aesthesiometer.....	5.00
3243	447	Nunn's.....	12.00	1002	2	Urine Test.....	6.00
		Record's.....	5.00	2928	353	Van Derveer's Urethral Bougie, Nos. 10 to 30,	
3240	446	Reid's.....	6.00			French.....	.75
3193	437	Schlotterbeck's.....	7.00	2928	353	Urethral Bougie, Nos. 31 to 40, French,	1.00
3232	445	Schuyler's.....	12.00	3593	502	Uterine Dilator.....	5.50
3179	431	Segala's.....	8.00	3548	496	Van de Warker's Antelexion Pessary.....	1.75
3332	461	Simon's Set of 4 Simon-Bozeman's, and		3831	558	Needle Forceps and Needle.....	7.00
		4 Simon-Sims' Blades, with 2 Socket		3832			
		Handles.....	20.00	3550	496	Retroflexion Pessary.....	1.75
3333	461	Simon's Set of 8 Flat Shaped Blades,		3818	551	Van Huvel's Forceps Saw.....	
		with 2 Socket Handles.....	20.00	2144	201	Vapor Douche, Buttle's Inhaler.....	2.00
3212	442	Sims'.....	2.50	2141	201	Hardy's Chloroform Douche.....	4.00
3219	443	Sims' Bivalve.....	5.00	331		Varicocele:	
3189	435	Stohlmann's.....	8.00	2820	332	Henry's Cartilage Scissors.....	5.00
3205	441	Storer's.....	4.00	2815	331	Henry's Depilating Forceps.....	2.50
3207				2819	332	Henry's Scrotal Clamp.....	8.00
3221	443	Taliaferro's.....	2.50	2824	334	Keyes' Varicocele Needles, each.....	1.75
3238	446	Taylor's.....	4.00			Keyes' Varicocele Needle, Improved.....	6.00
3225	443	Thomas'.....	10.00	2816	332	Lewis' Varicocele Clamp.....	4.00
3203	439	Thomas'-Cusco's.....	4.00	2817	332	Williams' Varicocele Clamp.....	4.00
3224	443	Thomas' Self-retaining.....	18.00	2818	332	Williams' Varicocele Clamp.....	.75
3222	443	Thomas'-Sims'.....	10.00			See also Suspensory.	
3173	431	Thomas' Telescopic.....	5.00	330		Varicose Veins.	
3176	431	Thomas' Tubular.....	3.00	330		Elastic Stockings. Prices on p. 330.	
3192	437	Tiemann's Quatrivalve.....	10.00	330		Varix.	
3188	435	Tiemann's Trivalve.....	12.00			Elastic Belts. Prices on page 330.	
3209	441	Wackerhagen's.....	10.00	3787	548	Vectis, Folding.....	3.50
3178	431	Weber's.....	7.00			Flain.....	2.50
3187	435	Weiss'.....	16.00	3788	548	Ryerson's Adjustable.....	7.00
4412	770	Woodward's.....	5.50	3783	546	White's.....	2.50
3223	443	Yarrow's.....	8.50	3767	540	Vedder's Obstetrical Forceps.....	13.00
3254	448	Vaginal Sponge Holder.....	.75	1600	103	Velpeau's Bone Forceps.....	4.00
3459	488	Vaginal Support, Bozeman's.....	2.00	4209	712	Writer's Cramp Apparatus.....	10.00
		See also Pessary.		3031a	386	Velvet Eye Catheter.....	.75
		Vaginal Syringes:		3031b	386	Catheter.....	.75
		Davidson's, No. 1.....	2.00	3031c	386	Catheter.....	1.00
		Davidson's, No. 2.....	1.50	3031d	386	Catheter.....	1.50
3414	480	Foster's.....	4.00	3031e	386	Catheter.....	.75
3415	481	Fraser's.....	3.00	3031f	386	Catheter.....	1.00
3416	481	Frost's.....	2.50	3031g	386	Catheter.....	1.00
3417	481	Parker's.....	3.00	3031h	386	Catheter.....	.75
3418	482	Woodward's.....	2.50	3031i	386	Catheter.....	.75
		See also Uterine Irrigation, Douching.		3044	389	Catheter, Double Current.....	2.50
1090	13	Valentine's Knife, Charrière's Model.....	8.00	2620	294	Nasal Feeding Tube.....	1.00
1082	12	Knife, Tiemann's Model.....	8.00			Perineum Tube.....	1.00
		Valgus Ankle:		2665	303	Rectal Feeding Tube.....	1.50
4201	709	Detmold's Ankle Spring, ea.	4.00 to 6.00	2621	294	Stomach Tube.....	1.50
4202	710	Weak Ankle Brace, each	5.50 to 10.00	2621	294	Stomach Tube, Long.....	2.00
		Valgus, Talipes, see Orthopaedic: Deform-		1140	19	Ventricle Pique.....	2.50
		ities of the Feet: Talipes Valgus.		2723	310	Verona's Winch.....	3.50
4379	765	Van Arsdale's Periosteum Elevators, Set			677	Vertebral Column.	
		of 3.....	6.00		703	Accidents to.	
		Syringe, Antiseptic.....	13.00			See also Spinal Braces.	
1322	79	Van Brun's Needle.....	1.00	448		Vesico- and Recto-Vaginal Fistula.	
2915	351	Van Buren's Cupped Sound.....	2.00	469		Vesico-Urethral Fissure.	
3164	428	Débris Syringe.....	3.50	3349	469	Skene's Fissure Probe and Knife, ea. . .	.75
1731	128	Double Silver Tube.....	4.00	449		Vesico-Vaginal Fistula.	
3089	405	Evacuating Catheter and Bag.....	7.00	457		Bozeman's Button Suture.	
1694	122	Fumigation Lamp.....	2.50	459		Simon's Operation.	
2728	310	Ligatur.....	7.00	448		Sims' Operation.	
	67	Pocket Set.....	22.00	464		Vesico-Vaginal Fistula, Artificial.	
2641	299	Rectal Depressor.....	2.50			See also Kolpo-Cystotomy.	
2637	299	Rectal Speculum.....	3.50			Vesico-Vaginal Fistula Sets:	
4294	747	Sequestrum and Nail Extracting For-		462		Bozeman's.....	100.00
		ceps.....	2.50	462		Emmet's.....	80.00
1537	98	Trepanning and Sequestrum Forceps..	2.50	462		Sims'.....	55.00
						Vial Cases, see Medicine Pocket Cases.	
				4044	630	Vial for Iodoform or Chloride of Mercury..	

FIG.	PAGE.		PRICE.	FIG.	PAGE.		PRICE.
1477c	93	Vidal's Serrefin, Angular.....	\$0.25	1057	8	Warren's Conformer.....	\$6.00
1477b	93	Serrefin, Straight.....	.25	1112	15	Demonstrating Knife.....	1.25
		Vivisection, see Physiological Experiments.		3038	387	Door Catheter.....	6.00
2941	357	Voilemiér's Stricture Divulsor.....	22.00	2885	346	Exploring Sound.....	2.50
2953	360	Urethrotome.....	16.00	2772	320	Hernia Syringe, No. 1.....	35.00
4006	620	Volkman's Dorsal Splint.....		2773	320	Hernia Syringe, No. 2.....	18.00
4385	766	Retractor.....	3.00	2760	316	Herniotome.....	6.00
3914	584	Sliding Rest.....	4.50 to 6.50			Mouth Gag.....	4.00
4386	766	Spoon.....	2.50	1724	127	Ovarian Trocar.....	
3915	584	T Splint.....	5.50 to 6.50	1280	75	Pus Basin.....	3.50
1156	24	Voltaic Armadillo. Prices on page 24.		1717	126	Trocar.....	6.00
2173	208	Voltolini's Uvula Hook.....	2.50	2792	326	Truss, Double.....	8.00 to 10.00
3833	559	Von Ramdohr's Needle Forceps, per set.....	10.00	2793	326	Truss, Single.....	5.00 to 7.00
3520	493	Pessary.....	1.50	2791	326	Truss, Umbilical.....	25.00 to 30.00
2396	243	Vulsellum Forceps.....	4.50	3039	387	Vermicular Catheter.....	3.00
2410	246	Forceps.....	3.00	4066	644	Washburn's Hip-joint Splint.....	7.00
3655	513	Forceps, Byrne's.....	3.00	4138	679	Spine Brace.....	15.00 to 20.00
3656	513	Forceps, Byrne's.....	3.00			Washing the Bladder:	
3662	513	Forceps, Cushing's.....	3.00	3044	389	Double Current Catheter, Velvet Eye.....	2.50
2394	243	Forceps, Musseux's.....	2.50	3043	389	Keyes' Irrigator.....	5.50
3646	512	Hook, Sims'.....	5.50			See also Catheter, Double Current.	
				41		Water, Hot, in Surgery.....	
3385	475	Wackerhagen's Applicator.....	.10	1011b	3	Water-Bath.....	2.50
3880	575	Bandage Shears.....	6.00	1246	42	for Arm and Hand.....	15.00
4084	653	Bed Rest.....	20.00	1247	42	for Lower Extremity.....	15.00
		Needle.....	1.00	1011c	3	Water-Oven, Piffard's.....	1.50
1294	76	Plaster Shears.....	6.00	1011d	3		
3209	441	Speculum Vaginae.....	10.00	3733	533	Water-Pad for Application of Cold or Heat.....	8.00
3954	600	Splint.....				Watson's Cervix Scissors.....	7.00
2465	264	Wagner's Brush Holder and 12 Brushes.....	2.50			Dilator, 2 sizes, each.....	8.00
2190	211	Post-Nasal Brush, 2 Stems and 12 Brushes.....	2.50			Double Tenaculum Forceps.....	10.00
						Needle, per dozen.....	1.50
2233	220	Post-Nasal Forceps.....	3.50	3999	618	Watson's Suspension.....	
	206	Rhinoscopic Set.....		4000	618	Suspension Bar.....	
1156	24	Waist Band, Voltaic.....	5.00			Waxham's Intubation Set.....	47.00
2561	281	Waldenburg's Pneumatic Apparatus.....				Laryngeal Forceps.....	5.00
2565	281	Pneumatometer.....	8.00	4202	710	Weak-Ankle Brace.....	5.50 to 10.00
2761	316	Wales' Herniotome and Rectotome.....	1.75	4204	710	Ankle Brace and Extension for Short Leg, Combined, Shoe extra.....	18.00
3658	513	Polypus Forceps.....	3.00	4201	709	Ankle Spring, Detmold's.....	4.00 to 6.00
2661	303	Rectal Bougies, Soft Rubber:		4200	709	Legs, Support for, Adult's size.....	35.00 to 70.00
		Nos. 1, 2, 3, each.....	1.50			Legs, Support for, Child's size.....	25.00 to 35.00
		Nos. 4, 5, 6, each.....	2.00	1488	94	Weber's Arteriversion Tenaculum.....	1.50
		Nos. 7, 8, each.....	2.50	1798	148	Curved Canalicula Knife.....	1.75
		Nos. 9, 10, each.....	3.00	1788	147	Graduated Dilator, Lachrymal.....	1.00
		Nos. 11, 12, each.....	3.50	1797	148	Half-curved Canalicula Knife.....	1.75
2662	302	Sheath for Bougies.....	.50	1944	167	Iris Hook, Double.....	1.50
2659	302	Recto-Colonic Bougie, Nos. 4, 5, 6, ea.....	3.50	1943	167	Keratome.....	2.50
2664	302	Rubber Bag Syringe.....	3.00	3546	495	Pessary.....	4.50
2663	302	Scale of Sizes for Bougies.....		3178	431	Speculum Vaginae.....	7.00
2796	327	Walker's Combination Supporter.....	12.00 to 18.00	2095	196	Tensor Tympani Instrument.....	8.00
4399	769	Drainage Tubes, each.....	.60		181	Webster's N. Y. Polyclinic Set of Eye Instruments.....	72.00
3105	411	Evacuator.....	22.00	1969	173	Wecker's Canulated Needle.....	2.00
3010	381	Prostate Gland Dilator.....	35.00	1963	171	Corneal Incision.....	
3160	427	Prostatic Divulsor.....	2.00	1869	154	Double Strabismus Hook.....	4.00
4348	759	Rectum Specula, 3 with 1 Handle.....	15.00	1928	164	Iridotomy Scissors.....	8.00
4370	764	Urethrotome, Dilating.....	35.00	1794	147	Lachrymal Canula.....	1.25
3161	427	Urethrotome, External.....	1.75	1874	154	Strabismus Hook.....	1.25
3162	427	Urethrotomy Staff.....	2.00	1056	8	Weed's Cyrtometer.....	10.00
		Wallace's Obstetrical Forceps.....	8.00	1261	49	Weir's Antiseptic Spray.....	15.00
3547	496	Spring Tent, each.....	1.50			Antiseptic Spray, with Gauze.....	16.00
3562	498	Spring Tent, each.....	1.50			Antiseptic Spray, with Gauze and Movable Tube.....	17.00
1029	5	Walsh's Stethoscope.....	1.00			Antiseptic Spray, with Gauze and Movable Tube, Large.....	21.50
1968	173	Walton's Grooved Needle.....	2.00			Antiseptic Spray, with Gauze and 2 Movable Tubes, Large.....	24.00
1939	165	Iris Forceps.....	2.50	2224	219	Double Gouge Forceps.....	3.50
1975	174	Reclination Needle.....	1.25	2853	343	Meatoscope.....	1.25
4397	769	Ware's Ligature Bottle.....	1.50	2371	237	Mouth Gag.....	7.00
		Ligature Bottle, Hospital Size.....	3.00		67	Pocket Set.....	30.00
1044	7	Stethoscope.....	4.50				
	41	Warm Water in Surgery.....					
1246	42	Warm Water Bath, Forearm and Hand.....	15.00				
1247	42	Lower Extremity.....	15.00				
2183	210	Warner's Catarrhal Douche.....	1.00				
1739	133	Warren's Aspirator Needle.....	3.00				

FIG.	PAGE.		PRICE.
		Weir's Pocket Set, Aseptic	\$20.00
2216	217	Rhinoplastos.....	3.00
2178	209	Sniff Glass.....	.75
2884	346	Urethrometer.....	18.00
1671	120	Vaccinating Lancet.....	.75
1670	120	Vaccinating Lancet and Comb.....	1.00
3187	435	Weiss' Speculum.....	16.00
3104	411	Thompson's Evacuator.....	30.00
2934	355	Weisse's Bougie à Boule.....	1.00
1358	83	Bullet Forceps.....	10.00
2935	355	Urethral Sound.....	1.00
1931	164	Welker's Iridectomy Instrument.....	12.00
1988	175	Wells' Enucleation Spoon.....	2.75
2532	277	Retractor, Tracheotomy.....	2.00
3701	527	Wells' (Spencer) Artery Torsion Forceps.....	3.50
3712	529	Clamp.....	6.00
3703	528	Clamp Forceps.....	8.00
1720	127	Ovariectomy Trocar.....	10.00
		Ovariectomy Trocar, Curved.....	11.00
1727	128	Ovariectomy Trocar, Latest.....	20.00
3702	528	Pedicle Clamps, Set of 3, with Levers.....	25.00
3696	526	Pedicle Forceps, Angular.....	5.00
3697	526	Pedicle Forceps, Straight.....	5.00
3698	526	Pedicle Forceps, T Shaped.....	5.00
3695	525	Sac Forceps.....	4.50
3785	548	Wenck's Amniontome.....	2.50
3583	501	Wessinger's Uterine Dilator.....	4.50
2604	289	Westbrook's Curette, for Pleural Cavity.....	2.50
2375	297	Westmoreland's Speculum Oris.....	6.00
2962	362	Stricture Instrument.....	12.00
2880	346	Whalebone Bougie, Banks', each.....	1.25
2879	346	Bougie, Hunter's.....	.75
2864	345	Bougie, Olivary.....	.75
2878	346	Guide, Gouley's, each.....	.50
		Guide, Otis'.....	.75
2612	292	Probang, with Silver Basket.....	3.50
		Probe, Buttles'.....	.50
3360	473	Probe, Thomas'.....	.50
	78	Whale Tendon Ligature, Ishiguro's, per coil.....	.40
1178	33	Wheel Electrode.....	5.00
1450	91	Wheeler's Torsion Forceps.....	7.00
2996	375	Wheelhouse's Staff, Urethrotomy.....	2.00
2903	350	Wheelock's Reverse-flow Syringe.....	2.00
2495	288	Whistler's Cutting Laryngeal Dilator.....	18.00
		White's (Blake), see Blake-White's.....	
2822	333	White's Elastic Scrotal Compress.....	3.00
1071	11	Hæmarumscope.....	2.50
2765	317	Hernia Ligator.....	10.00
3608	505	Hysterotome.....	12.00
3738	536	Obstetrical Forceps.....	8.00
2822	333	Orchitis Compressor.....	3.00
3799	549	Perforator.....	4.50
		Urethrotome (Blake White's).....	40.00
3584	501	Uterine Dilator.....	4.50
3438	485	Uterine Repositor.....	5.00
3783	546	Vectis.....	2.50
2331	233	Whitehead's Gum Knife.....	1.50
1586	102	Hoe.....	1.50
2332	233	Hoe.....	1.50
2323	232	Mouth Gag.....	12.00
2329	232	Paring Knife, Right and Left, each.....	1.50
2658	302	Rectal Dilator.....	3.00
2324	232	Seizing Forceps.....	4.50
2334	233	Spiral Needle, Right and Left, each.....	1.75
3158	427	Staff and Knife.....	12.00
4414	770	Urethrotome.....	15.00
2312	231	Whitson's Harelip Clamp.....	3.00
1500	95	Wight's Amputating Knife.....	5.50
1465	92	Artery and Ligature Forceps.....	1.75
3882	575	Bandage Shears.....	3.50
1239	39	Blowpipe.....	11.00
	69	Pocket Set.....	37.00
		Pocket Set, Aseptic.....	20.00

FIG.	PAGE.		PRICE.
2599	287	Wight's Spray Apparatus	\$5.00
4335	758	Wilcox's Foot Piece for Taylor's Hip Splint	
4221	717	Genu Valgum Brace	30.00 to 35.00
3686	519	Hysterectomy Pin	1.00
3692	525	Sac Forceps	5.50
4334	757	Umbilical Truss	20.00
1919	163	Wilde's Canulated Forceps	12.00
1918	163	Canulated Forceps, Scissors and Forceps-Needle	15.00
2006	184	Gorget	1.00
2063	192	Polypus Snare	3.50
1998	182	Tubular Ear Speculum, Set of 3 :	
		Hard Rubber	1.50
		Plated	2.50
		Silver	4.00
2586	285	Wile's Spray Apparatus	
3471	489	Wilhoff's Pessary	.50
3538	495	Stem Pessary	.75
3565	498	Tent Expeller	4.00
2230	220	Wilkerson's Revolving Trocar	3.50
4079	650	Willard's Hip-joint Splint	30.00 to 50.00
1789c	147	Williams' Lachrymal Dilator	1.00
1789a	147	Lachrymal Probe	.75
1789b	147	Lachrymal Probe	.75
1789d	147	Lachrymal Style	.50
1789e	147	Lachrymal Style	.50
2643	299	Rectal Speculum	4.50
2818	332	Varicocele Clamp	.75
2817	332	Varicocele Clamp	4.00
		Wilson's Uterine Dilator	9.00
1053	7	Winterich's Percussion Hammer	2.50
2925	352	Winternitz's Psychrophor, Silver	4.00
		Psychrophor, Soft Rubber	2.50
3328	457	Wire Adjuster, Bozeman's	2.00
3276	450	Adjuster, Sims'	1.25
3277	451	Adjuster, Sims'	1.50
3309	454	Cutter, Abbott's	6.00
3331	458	Cutter, Perry's	6.00
3278	451	Cutter, Sims' Scissors	3.50
3330	458	Cutter, Tucker's	6.00
3675	516	Ecraseur, Sajou's	4.00
4341	759	Ecraseur, Skene's	7.50
2739	311	Ecraseur, Smith's, Curved	6.00
3668	515	Ecraseur, Smith's, Straight	5.00
		See also Ecraseur.	
1841	151	Eye Speculum	.75
4082	653	Gauze Hip Splint, Hamilton's	15.00
4083			
3977	608	Gauze Splint, Byrd's	5.00
2131	199	Nose Clamp	1.00
2064	192	Snare, Blake's	3.50
2208	215	Snare, Bettman's-Jarvis'	8.50
2042	190	Snare, Bosworth's	4.00
		Snare, Bosworth's, with Curved and Straight Ends	5.00
2207	215	Snare, Bosworth's-Jarvis'	5.00
4326	756	Snare, Cohen's	4.00
4328	756	Snare, Cohen's Combination	
2205	214	Snare, Jarvis'	3.00 and 4.00
		Snare, Jarvis', with Curved and Straight Ends	5.00
3675	516	Snare, Sajou's	4.00
		Snare, Sajou's, with Curved and Straight Ends	5.00
		Snare, Sajou's, with Scissor Handles	11.00
		Snare, Stoerk's	11.00
2063	192	Snare, Wilde's	3.50
		Suture, Iron, per dozen coils	.25
		Suture, Silver, per coil	.50
1316	79	Suture Needles, per dozen	.50
3979	609	Splint, Clendinen's	
3975	608	Splint, Smith's	3.00
		See also Wire Gauze Splint.	
3321	456	Twister, Dawson's	2.50





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